

REVISION OF CAREX SECTION OVALES (CYPERACEAE) IN MEXICO

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INTRODUCTION

Carex L. section *Ovales* Kunth (subgenus *Vignea* P. Beauv. ex T. Lestib.) is the largest and most difficult section of the genus in the New World. Upwards of 75 species have been recognized in North America, including Mexico (Mackenzie 1931; Hermann 1970, 1974). It is largely confined to the New World, with only 5 species native in temperate Eurasia, *C. bohémica* Schreb., *C. maackii* Maxim., *C. macloviana* d'Urv., *C. ovalis* Gooden., and *C. pachystachya* Steud. (including *C. pyrophila* Gand.). Three of these, *C. macloviana*, *C. ovalis*, and *C. pachystachya*, are also native in North America. The western North American *C. subfusca* W. Boott is native in Hawaii. Otherwise, all occurrences of section *Ovales* in the Old World are introductions, including several species in New Zealand, and the weedy *C. longii* Mack. introduced in Hawaii (and New Zealand). The section, one of the most widespread in the New World, is distributed from the Arctic to Patagonia, although the greatest diversity of species occurs in the mountains of the western United States.

The section is considered very difficult taxonomically, and treatments of local areas vary considerably in the number of species recognized. Statements such as "...there is a strong temptation to recognize fewer species" (Voss 1972) are frequent in floristic literature. Working with the section, however, suggests that a significant component of the taxonomic difficulty within the group is the large number of species that look rather similar, at least on herbarium sheets, and that are distinguished by small differences. Extensive intergradation between recognized species and consequent blurring of species limits does not seem to be as pervasive as some literature would suggest, though certainly there are a number of problem species and species aggregates. Gaps between species may be narrow, but often they are deep. As well, the large number of species in the section, and the fact that it has not proven possible to subdivide it easily into discreet, small, natural groups, have discouraged people from tackling it, and there has been no overview of the entire section since Mackenzie (1931).

Essentially nothing is known about the reproductive biology of Mexican members of section *Ovales*. Studies on some members of the *Carex macloviana* aggregate northward (Whitkus 1988) found that the species are self-compatible and likely autogamous in the wild. Apomixis was not found by Whitkus (1988) and has never been conclusively demonstrated in any species of *Carex*. Only one chromosome number based on Mexican material is known, $n = 37$ in *C. peucophila* (Beaman et al. 1962), although a few other species have been counted from Canada or the United States.

This treatment represents a considerable amplification on past treatments of the section in Mexico. Liebmann (1850) and Kükenthal (1909) reported 3 species, *Carex longii* (as *C. leporina* var. *bracteata* Liebm. and *C. albolutescens* Schwein., respectively), *C. orizabae* Liebm. (as *C. macloviana* in Kükenthal, 1909), and *C. peucophila* T. Holm (as *C. pinetorum* Liebm.). Mackenzie (1931) reported only 4 species, *C. bonplandii* Kunth, *C. festivella* Mack., *C. longii*, and *C. peucophila*. Hermann (1974), in the first comprehensive treatment of Mexican species of *Carex* since Liebmann's, reported 13 species, but with only brief descriptions and generalized range statements. One of the 13, *C. purdiei* Boott, was reported only doubtfully and was deleted from the Mexican flora by Reznicek (1990).

Subsequent to Hermann's (1974) treatment, many new collections have accumulated. In reviewing this new material, particular attention was paid to the possible identity of Mexican collections with United States species, especially those from the western cordillera, as well as Central and South American species. This treatment recognizes 14 species; however, only 6 names remain in common with Hermann's treatment. Of the 14 species recognized here, 6 are widespread, being known from 5 or more collections over at least several states (*C. curvicularis* Reznicek, *C. lagunensis* M. E. Jones, *C. longii*, *C. microptera* Mack., *C. orizabae*, and *C. peucophila*). *Carex subfusca* is frequent locally, but confined to Baja California Norte. Four species, *C. athrostachya* Olney, *C. brevior* (Dewey) Mack., *C. tribuloides* Wahlenb., and *C. wootonii* Mack., are widespread northward, but have been collected only 1-3 times in Mexico, and three species, *C. festivelloides* Reznicek, *C. toluensis* (F. J. Herm.) Reznicek, and *C. interjecta* Reznicek, are apparently rare Mexican endemics known thus far only from their types. Considering the number of species known from very few collections, this treatment must still be considered preliminary.

All the Mexican members of section *Ovales* are montane plants; essentially none occur below 1000 m, and most species are confined to above 2000 m. Most are plants of open, moist meadows, and may very locally even be important components of such habitats. A few occur in denser shade of forests. Although found essentially throughout Mexico, the diversity of species is greatest in the Transvolcanic Belt, in the Distrito Federal, and the State of México. There, species occurring primarily in the Sierra Madre Occidental, such as *C. lagunensis* and *C. microptera*, co-occur with species occurring mostly in the Sierra Madre Oriental, such as *C. peucophila* or *C. longii*. Most of the local endemics also occur in the Transvolcanic Belt.

Mexican members of section *Ovales* are in no way a natural group; the closest relatives of most of the Mexican species, even the endemics, are probably extralimital species. Of the 14 species here recognized; 7 are endemic to Mexico or nearly so (*Carex peucophila* and *C. orizabae* barely range into Guatemala); 4 species (*C. athrostachya*, *C. microptera*, *C. subfusca*, and *C. wootonii*) are plants of the western Cordillera of the United States that range south as far as Mexico; 2 species (*C. longii* and *C. tribuloides*) are common eastern North American species disjunct to Mexico, of which one, *C. longii*, also ranges south through the Caribbean and Central America to Ecuador; and *C. brevior* is transcontinental in North America.

Mackenzie (1931) divided the section into 11 unranked groups based on perigynium and scale features, characteristics of the vegetative shoots including sheath morphology, texture, and color, and inflorescence bract length. To what extent these groups are natural is still unclear, and no attempt has been made here to

assign Mexican species to Mackenzie's groups. In fact, relationships within the section are too poorly known to speculate with much confidence about the phylogenetic relationships of the endemics, though most appear to be similar to species from the western United States.

The primary taxonomic characters that have proven useful in the systematics of the section reside in the perigynia, and include size, shape, color, beak/body proportions, marginal serrulations, and beak apices. Achenes, rhizomes, anthers, scale color, inflorescence morphology, and leaf and sheath characters also provide some useful features. As such, essentially mature, complete material is vital for determinations. Of particular importance for identification is understanding that perigynia can vary widely in shape from the bottom to the top of a spike. The lowermost perigynia in a spike are the widest, but are often unusually short and sometimes distorted and asymmetrical. The uppermost perigynia in a spike are the narrowest and tend to be essentially similar in shape among all the species. Thus, the lower (but not the lowermost one or two) to middle perigynia in a spike are most reliable when applying measurements from the key. As well, all plants that normally have large or wide perigynia occasionally produce depauperate spikes or inflorescences with perigynia smaller and often narrower than typical for the species. Before keying plants, sampling of the collection to find the largest undistorted, \pm symmetrical perigynia (excepting sometimes the lowermost in a spike) is extremely helpful. Perigynium width in the keys and descriptions has been measured with the wings flattened out, but in some species the wings apparently arch forward in life, as shown in the illustrations. Colors of perigynia and scales also provide important features for identification in some instances; however, both scale and perigynium colors may be unusually pale on plants growing in dense shade, and may fade with weathering and with age on herbarium specimens.

An additional complication with species occurring in alpine sites is that at higher elevations and in exposed situations, all tend to become dwarfed and compact. The different species thus may look remarkably similar. These plants can be exceptionally difficult to determine reliably.

Most keys to the section (e.g., Hermann 1970, 1974) are very difficult to use, because major, early subdivisions in the keys often rely on whether or not the ultimate apex of the beak is flattened and serrulate or terete and smooth and on whether or not the perigynia are planoconvex or flattened and scalelike. These distinctions are rather subtle, and their interpretation requires substantial – some might say transcendental – familiarity with the section. The key presented here avoids these features, except as subsidiary characters for distinguishing species pairs, and, I hope, will be easier to use.

Immature specimens, with barely developed perigynia, can sometimes be recognized, if complete, but cannot be keyed. Slightly immature material can sometimes be keyed by applying the following facts. Perigynia mature basipetally, thus beaks are essentially full size before the body is fully developed, especially in species with broadly winged perigynia. With experience, rough estimates of size and shape of perigynia can be made from immature material based on the size and width of the beak and comparison with reliably determined material. Nerves on the perigynia also tend to be very faint until full maturity, even among species with distinctly nerved perigynia. Scale color develops fully before anthesis, but perigynium color (if not green) develops only near or at maturity.

All names based on Mexican specimens are typified here. Names of all taxa recognized are also typified, if possible, even if the types are extralimital, but

synonymy based on types from beyond Mexico is not given. However, because there exists considerable confusion about their application, all names of Latin American members of section *Ovales* from beyond Mexico that are mentioned in the text are typified, even if they are not treated in detail. Species are arranged alphabetically, and all Mexican specimens that were examined are cited, arranged alphabetically by states and by collector and number.

TAXONOMY

Carex section **Ovales** Kunth, Enum. Pl. 2: 394. 1837.—TYPE: *Carex ovalis* Gooden. [*Carex leporina* of authors, not L.]

Cespitose to occasionally mat-forming perennials, rhizomes very short to ± elongate and short-creeping; culms trigonous, bladeless basal sheaths always present, but sometimes rapidly disintegrating. Leaves usually 3–10 on the fertile culms, mostly on the lower 1/10–1/3 of the culm, occasionally the culm more leafy. Vegetative culms present, sometimes much leafier than the fertile culms and with the leaves strongly tristichous. Inflorescences densely capitate with the spikes essentially indistinguishable to open and elongate with at least the lower spikes clearly separated, 0.6–10 cm long, the lower inflorescence bracts usually scalelike or at most setaceous-prolonged, shorter than the inflorescence, rarely leafy and much longer than the inflorescence; spikes single at the nodes, gynaeandrous, lance-ovoid to obovoid or turbinate, sometimes with a prominent staminate basal portion (especially on the terminal spike). Perigynia with bodies narrowly lanceolate to orbicular or even reniform, strongly flattened, scalelike, biconvex, or planoconvex, essentially lacking internal spongy tissue, narrowly to broadly winged and serrulate-margined, at least above, gradually tapered to abruptly contracted to a beak; beaks flattened and serrulate-margined except sometimes at the apex. Achenes biconvex, narrowly ovate to oblong to obovate. Chromosome numbers (Whitkus 1991): $n = 26-45$.

KEY TO CAREX SECTION OVALES IN MEXICO

1. Inner band of especially the upper leaf sheaths herbaceous and green nearly to apex; pistillate scales whitish hyaline, green, or pale silvery brown.
 2. Perigynia 1.6–2.8 mm wide, (1.3–) 1.6–2.2 times as long as wide; widest leaves 2–4 (–4.5) mm wide. 7. *C. longii*.
 2. Perigynia 0.9–1.5 (–1.7) mm wide; (2.3–) 2.7–4 (–5) times as long as wide; widest leaves (3.5–) 4–5.5 (–7) mm wide. 13. *C. tribuloides*.
1. Inner band of leaf sheaths hyaline, whitish to pale brown for most of their length; pistillate scales yellowish brown to purplish black.
 3. Larger perigynia 2–3.4 mm wide; usually 1.1–2.2 times as long as wide (except often in *C. wootonii*). 14. *C. wootonii*.
 4. Larger perigynia 3.2–5.4 mm long, usually 1.1–2.2 times as long as wide. 2. *C. brevior*.
 5. Terminal spikes with a prominent staminate portion 3–9 (–14) mm long; larger perigynia 2.4–3.4 mm wide; inflorescences usually elongate, (1.3–) 2.5–6.5 cm long.
 5. Terminal spikes with the basal staminate portion inconspicuous, 1–3 mm long; larger perigynia 2–2.6 (–2.8) mm wide; inflorescences capitate to ovoid, (0.8–) 1.2–2.5 (–3.5) cm long.
 6. Perigynium bodies usually (1.9–) 2.5–4 (–5.4) times the length of the beaks; beaks 0.6–1.2 (–1.5) mm long, usually flattened and serrulate-margined nearly to apex.

7. Larger anthers 1.8–2.8 mm long; larger perigynia 4.3–5.4 mm long; spikes usually 4–8; plants densely cespitose. 6. *C. luginensis*.
7. Larger anthers 1.2–1.8 mm long; larger perigynia 3.5–4.4 (–4.7) mm long; spikes usually 2–5; plants usually with short-creeping rhizomes. 10. *C. peucophila*.
6. Perigynium bodies usually 1.9–2.4 times the length of the beaks; beaks 1.3–1.6 mm long, the apical 0.4–0.6 mm terete and smooth. 12. *C. toluensis*.
3. Larger perigynia 1–1.9 mm wide, usually more than 2.2 times as long as wide.
8. Larger perigynia 2.5–3.5 (–4.5) times as long as wide, usually (3.0–) 3.8–5.8 mm long; beaks (0.8–) 1.2–1.9 (–2.1) mm long.
9. Lowermost inflorescence bracts consistently 1.2–6 (–9) cm long, exceeding the inflorescence.
10. Larger perigynia 3–4.6 mm long, 1–1.5 mm wide; achenes 1–1.6 mm long, 0.7–0.9 mm wide. 1. *C. athrostachya*.
10. Larger perigynia 4.3–5.8 mm long, usually 1.5–1.9 mm wide; achenes 1.7–2 mm long, 1–1.3 mm wide. 4. *C. festiveloides*.
9. Lowermost inflorescence bracts usually scalelike and shorter than the inflorescence, occasionally but not consistently setaceous-prolonged to 1.6 (–8) cm long.
11. Perigynia dark reddish brown to purplish black on the beak and usually the distal portion of the body, the same color as the pistillate scales and thus inconspicuous in the uniformly dark inflorescence, usually clearly 1–6-nerved over achene adaxially, beaks usually 1.4–1.9 mm long. 9. *C. orizabae*.
11. Perigynia green to pale brown distally except for a narrow, darker stripe on the beak and the beak apex, contrasting with the brown to reddish or purplish brown pistillate scales and thus forming a two-toned inflorescence; usually nerveless or sometimes faintly 1–5-nerved over achene adaxially; beaks usually 1–1.5 mm long.
12. Achenes (1.1–) 1.2–1.4 mm wide; plants loosely cespitose to colonial, rhizomes short-creeping. 3. *C. curvicultmis*.
12. Achenes 0.8–1.1 mm wide; plants densely cespitose, rhizomes very short. 8. *C. microptera*.
8. Larger perigynia 1.3–2.6 times as long as wide, usually 2.7–4.5 mm long; beaks 0.6–1.5 mm long.
13. Pistillate scales uniformly dark reddish brown to purplish black; inflorescence densely capitate, the individual spikes not easily discernible. 9. *C. orizabae*.
13. Pistillate scales yellowish brown to reddish brown, with a greenish or paler midrib; inflorescences capitate-ovoid to ± elongate, the individual spikes usually clearly visible.
14. Achenes (1.1–) 1.2–1.5 mm wide; perigynia 1.6–1.9 mm wide; spikes 2–5 (–7); plants usually with short-creeping rhizomes. 10. *C. peucophila*.
14. Achenes 0.9–1.1 (–1.2) mm wide; perigynia 1.2–1.8 mm wide; spikes (3–) 5–9; plants cespitose.
15. Inflorescences elongate, 2.5–3.5 cm long, the lower spikes clearly separate; leaves on the lower 2/5–2/3 of the culm; perigynia appressed, (3.5–) 3.7–4.5 mm long. 5. *C. interjecta*.
15. Inflorescences capitate-ovoid, 1.1–2.2 (–2.8) cm long, the spikes discernible but overlapping; leaves on the lower 1/10–2/5 of the culm; perigynia spreading-ascending, 2.7–4.1 mm long. 11. *C. subfusca*.

1. *Carex athrostachya* Olney in A. Gray, Proc. Am. Acad. 7: 393. 1868.—TYPE: U.S.A. California: Yosemite Valley, 4000 ft, 17 Jun 1863, *Brewer 1650* (lectotype, here designated: GH!; isolectotype: MO!). Figs. 1a, 2a.

Densely cespitose in large clumps; fertile culms 15–80 cm tall, erect, trigonous, scabrous-angled; bladeless basal sheaths pale brown, disintegrating into short, dark brown fibers. Leaves 2–5, on the lower 1/5–1/3 of the culm; blades 3–30 cm long, 1.2–4 mm wide, plicate, glabrous, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 1.5–9 cm long, tightly enveloping culms, glabrous,

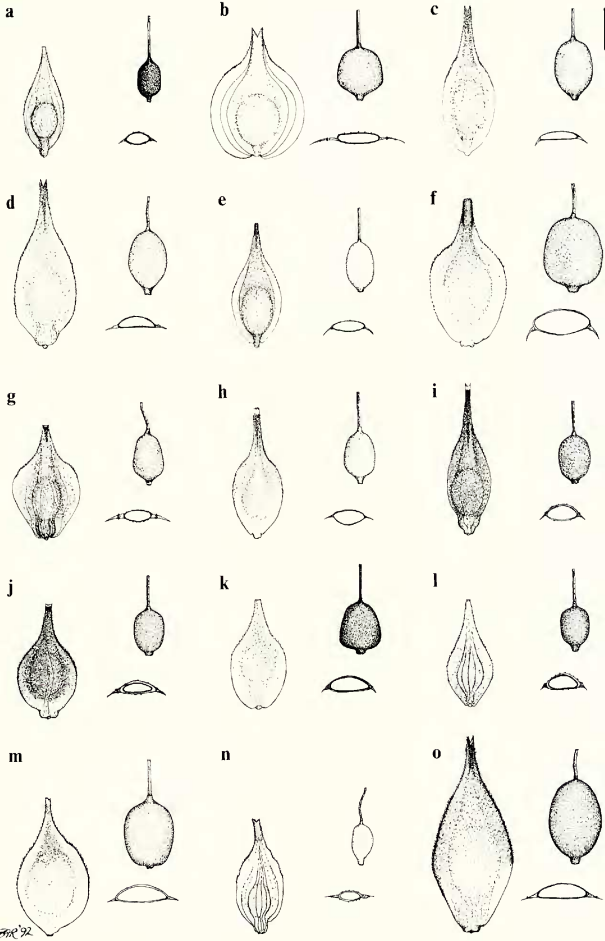
green; the inner band of sheaths glabrous, whitish hyaline, sometimes prolonged up to 4 mm beyond the leaf bases, the apex concave, whitish hyaline; ligules 1.5–6 mm long, rounded, the free portion entire to \pm erose, up to ca. 1 mm long. Vegetative culms ca. 1–15 cm tall with ca. 5–9 leaves; leaves tristichous and mostly clustered in the upper 1/2 of the culm. Inflorescences 0.8–2.2 cm long capitate-ovoid, the spikes strongly overlapping and often barely distinguishable, spikes single at nodes, sessile, lowermost bracts setaceous to \pm leafy, 1.2–9 cm long and up to ca. 2 mm wide, conspicuous, sheathless but dilated at base, the upper bracts much reduced; spikes 4–10, gynaeceandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, ovoid, ca. 5–10 mm long, pistillate portion 4.5–9 mm long, 4.5–6.5 mm wide, ca. 10–40-flowered, staminate portion ca. 1–2 mm long, appressed against the pistillate portion, ca. 1–4-flowered. Pistillate scales 2.4–4.3 mm long, 0.9–1.3 mm wide, narrowly ovate, acute to acuminate, yellowish brown to dark reddish brown with a narrow green center and narrow hyaline margins, 1 (–3)-nerved. Staminate scales 1.9–4.5 mm long, 0.8–1.3 mm wide, lanceolate to narrowly ovate, acuminate, yellowish brown to dark reddish brown with a narrow green center and narrow hyaline margins, 1-nerved. Perigynia 3–4.6 mm long, 1–1.5 mm wide, 2.5–3.2 (–4.5) times as long as wide, ascending, biconvex and very thin except where distended by the achene, with narrowly ovate to narrowly elliptic bodies 1.9–3 mm long, 1.5–2.2 (–2.9) times as long as wide and 1.5–2.5 times as long as the beak, widest 0.9–1.5 mm above base, narrowly winged and serrulate-margined above the widest part, gradually tapered into an indistinct beak, green to pale brown, glabrous, sessile to short-stipitate, adaxial side nerveless or up to 6-nerved over achene, abaxial side faintly 3–9-nerved over achene; beaks 0.8–1.6 mm long, flattened and serrulate-margined but with the apical 0.4–0.6 mm terete and smooth, the apex bidentulate with irregular teeth up to 0.2 mm long. Achenes 1–1.6 mm long, 0.7–0.9 mm wide, 1.2–1.6 times as long as wide, biconvex, narrowly ovate-oblong, pale brown, short-stipitate; style straight; stigmas 2. Anthers 3, 1.1–2.2 mm long. Chromosome number: $n = 34$ (Packer & Whitkus 1982).

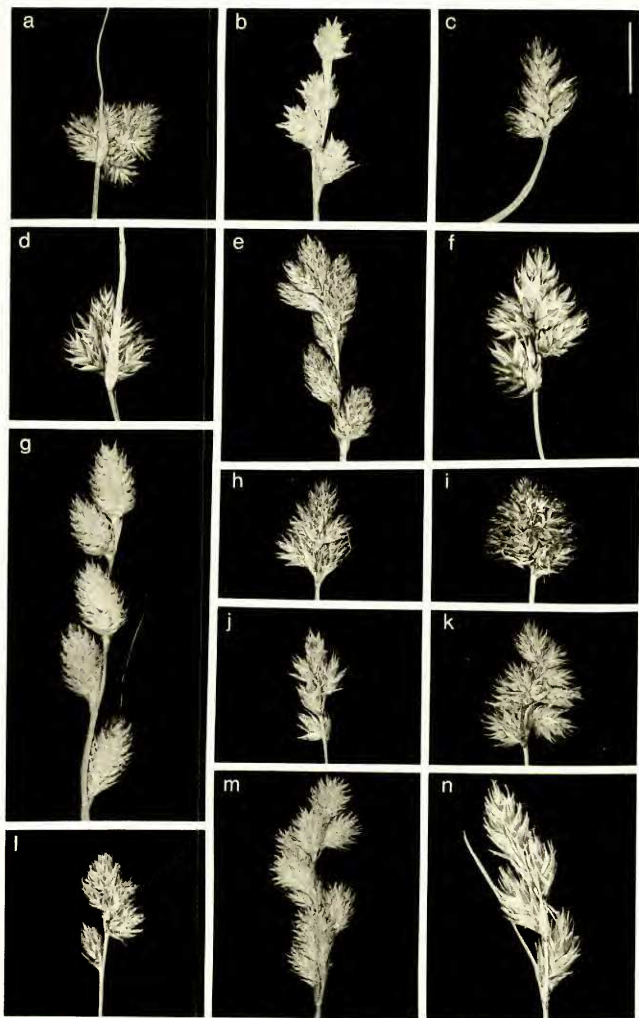
Known only from wet meadows and stream valleys in the Sierra San Pedro Mártir of Baja California Norte at about 2100 m elevation (Fig. 3). Collections made in late August were in fruit.

SPECIMENS EXAMINED. BAJA CALIFORNIA NORTE: Sierra San Pedro Mártir, Santa Rosa, 30°48'N, 115°21'W, 20 Aug 1967, Moran & Thorne 14389 (SD); La Grulla, 30°54'N, 115°27'W, 22 Aug 1967, Moran & Thorne 14491 (RSA, SD).

Carex athrostachya is a very widely distributed western North American species ranging from Alaska to Saskatchewan and south to California and western-most Texas. It is a species of transient or cyclical habitats at low to mid-montane elevations, including temporary ponds holding water only in spring, shores of rivers, lakes, and streams with fluctuating water levels, and early successional wet meadows. It probably has a long-lived seed bank.

FIG. 1. Perigynia of *Carex*: adaxial view (left), transverse section (bottom right), and achene adaxial view (top right). a. *C. athrostachya* (Moran & Thorne 14491, SD). b. *C. brevior* (Bartlett 10088, MICH). c. *C. curvicalmis* (Rzedowski 21567, TEX). d. *C. festivelloides* (Pringle 1402, GH). e. *C. interjecta* (Freudentein 2178, MICH). f. *C. lagunensis* (González & Rzedowski 1889, ENCB). g. *C. longii* (Reznicek 8111 & Reznicek, MICH). h. *C. microptera* (Tenorio L. 793 & Romero T., MICH). i. j. *C. orizabae* (i. Vega 432, NY; j. Anderson 12947, MICH). k. *C. peucophila* (Reznicek 8067 & Reznicek, MICH). l. *C. subfusca* (Tallent 744, MICH). m. *C. toluensis* (Mick & Roe 236, MICH). n. *C. tribuloides* (Pringle 7802, GH). o. *C. wootonii* ([Schneider] 954, MICH). Scale: bar = 1 mm. Drawn by Susan A. Reznicek.





Hermann (1970) noted that this species and *C. subfusca*, also occurring in the Sierra San Pedro Mártir, can be difficult to distinguish if the prolonged bracts of *C. athrostachya* are lacking (or if an inflorescence of *C. subfusca* is found with unusually elongate bracts). He noted several very subtle characters that tell these two species apart, but normally the perigynia of *C. athrostachya* tend to be longer (3–4.6 mm) than at least Baja populations of *C. subfusca* (2.7–4.1 mm) and proportionately narrower, 2.5–3.2 (–4.5) times as long as wide in *C. athrostachya* versus 1.9–2.6 times as long as wide in *C. subfusca*. If an individual of *C. athrostachya* were found that lacked the elongated lower inflorescence bracts, it would key here to *C. microptera*, from which it could be distinguished by its usually narrower and much more narrowly winged perigynia only 1–1.5 mm wide. *Carex microptera* has perigynia 1.2–1.9 (–2.4) mm wide, which are broadly thin-winged. In addition, the perigynia of *C. athrostachya* are more gradually tapered to an indistinct beak. The perigynium beaks of *C. microptera* are well defined. The inflorescences of *C. athrostachya* are mostly substantially paler, with yellowish brown to reddish brown scales. *Carex microptera* has darker reddish brown to purplish brown pistillate scales, and the inflorescences are thus darker overall.

Carex athrostachya was first reported from Mexico in Hermann (1974), based on *Balls 4202*. González E. (1990) reported two additional collections, *González E. 1151* and *1142*. These collections, all from high elevations in the Transvolcanic Belt, are here referred to *C. orizabae*.

2. *Carex brevior* (Dewey) Mackenzie in Lunell, Amer. Midl. Naturalist 4: 235. 1915. *Carex straminea* var. *brevior* Dewey, Amer. J. Sci. 11: 158. 1826.—
TYPE: U.S.A. [Massachusetts; western Massachusetts.] *Dewey s.n.* (holotype: ?GH, not located). Figs. 1b, 2b.

Cespitose in small clumps from thick, woody, very short-creeping rhizomes; fertile culms 15–120 cm tall, ± stiffly erect, trigonous, smooth except just below inflorescence, where usually finely scabrous-angled; bladeless basal sheaths pale brown, disintegrating into short, dark brown fibers. Leaves 3–5, on the lower 1/5–1/3 of the culm; blades 2.5–30 cm long, 1.5–3.5 mm wide, plicate, glabrous or ± papillose adaxially, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 1.5–8 cm long, tightly enveloping culms, glabrous, green, sometimes white-mottled; the inner band of sheaths glabrous, whitish hyaline, prolonged up to 2 mm beyond the leaf bases, the apex concave, whitish hyaline to pale brown; ligules 0.7–2.3 mm long, rounded, the free portion entire, up to 0.4 mm long. Vegetative culms different from the fertile, fully developed only after the perigynia are largely shed, annual, 3–30 cm tall with ca. 9–20 leaves; leaves tristichous and mostly clustered in the upper 1/3 of the culm, often slightly larger than those of the fertile culms. Inflorescences (1.3–) 2.5–6.5 cm long, erect to arching, the upper spikes usually overlapping, the lowest two spikes (3–) 6–14 (–23) mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or sometimes setaceous,

FIG. 2. Inflorescences of *Carex*. a. *C. athrostachya* (Moran & Thorne 14491, SD). b. *C. brevior* (Bartlett 10088, MICH). c. *C. curviculmis* (Rzedowski 21567, TEX). d. *C. festiveloides* (Pringle 1402, GH). e. *C. interjecta* (Freudenstein 2178, MICH). f. *C. lagunensis* (Vega 426, MEXU). g. *C. longii* (Arsène 9909, US). h. *C. microptera* (Spellenberg 11031 & Bacon, MICH). i. *C. orizabae* (Rzedowski 36660c, ENCB). j. *C. peucophila* (Rzedowski 22999, ENCB). k. *C. subfusca* (Moran 30986, SD). l. *C. toluensis* (Mick & Roe 236, MICH). m. *C. tribuloides* (Pringle 7802, GH). n. *C. wootonii* (Arizona, Coconino Co., Tallent 401, MICH). Scale: bar = 1 cm.

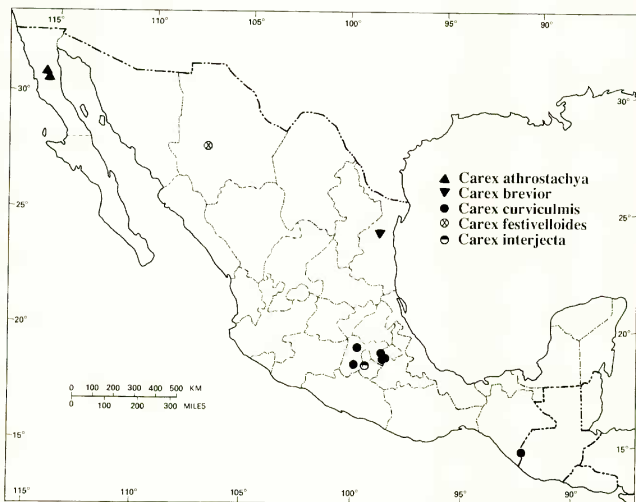


FIG. 3. Distribution of *Carex athrostachya*, *C. brevior*, *C. curviculmis*, *C. festiveloides*, and *C. interjecta*.

0.5–1.5 cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes (2–) 3–6, gynaeandrous; terminal spikes often slightly larger than the lateral and with a longer staminate base, but otherwise essentially similar, clavate-ovoid, 8–16 (–24) mm long, pistillate portion 5–10 mm long, 4.5–8 mm wide, (10–) 25–45-flowered, staminate portion 3–9 (–14) mm long, 1.5–2 mm wide, ca. 3–12-flowered. Pistillate scales 2.6–4.3 mm long, 1.2–1.8 mm wide, narrowly ovate, acute, pale yellowish brown to pale reddish brown with a narrow green center and narrow hyaline margins, 1-nerved. Staminate scales 3.1–5.2 mm long, 1.1–1.8 mm wide, narrowly ovate, acute to acuminate, pale yellowish brown to pale reddish brown with a narrow green center and narrow hyaline margins, 1-nerved. Perigynia (2.9–) 3.4–4.6 mm long, (2.1–) 2.4–3.2 (–3.4) mm wide, 1.1–1.7 times as long as wide, ascending, plano-convex with \pm orbicular bodies 2.1–3.5 mm long, 0.7–1.3 times as long as wide and 2.1–3.5 times as long as the beak, widest 1.2–1.6 mm above base, broadly thin-winged and finely serrulate-margined except near base, contracted into a beak, pale yellowish brown to brown, glabrous, sessile, adaxial side nerveless or rarely very faintly 1–5-nerved over achene, abaxial side 3–9-nerved over achene; beaks 0.8–1.5 mm long, strongly flattened and serrulate-margined to apex, the apex bidentate with scabrous-margined teeth 0.1–0.5 mm long. Achenes 1.5–2 mm long, 1.2–1.6 mm wide, 1.1–1.4 times as long as wide, biconvex, broadly ovate-oblong to \pm orbicular, pale brown, short-stipitate; style straight; stigmas 2. Anthers 3, 1.5–2.4 mm long. Chromosome number: $n = 34$ (Löve & Löve 1981).

A species of dry to moist sites in prairies and plains, collected only once in Tamaulipas (Fig. 3) in an unspecified habitat at ca. 1000 m.

SPECIMEN EXAMINED, TAMAULIPAS: La Vegona, vicinity of San José, Sierra de San Carlos, 5 Jul 1930, *Bartlett 10088* (MICH).

Carex brevior is widely distributed throughout North America from British Columbia to Quebec and south, in the west to Arizona and Texas. The single Mexican occurrence is disjunct from the nearest localities in central Texas. *Carex brevior* is unique among Mexican species of section *Ovales* in having \pm orbicular perigynium bodies essentially nerveless over the achene adaxially. *Carex longii* may sometimes have nearly orbicular perigynium bodies, although they are usually more obovate, but it differs from *C. brevior* in several features. *Carex longii* has elongate vegetative culms ca. 30–100 cm tall, herbaceous, green inner bands on at least the upper sheaths, perigynia distinctly 3–9-nerved over the achene adaxially and widest 1.4–2 mm above base, and achenes 0.8–1.1 mm wide and 1.5–1.7 times as long as wide. *Carex brevior* has shorter vegetative culms 3–30 cm tall, whitish hyaline inner bands to the sheaths, perigynia nerveless or rarely very faintly 1–5-nerved over achene adaxially and widest 1.2–1.6 mm above base, and achenes 1.2–1.6 mm wide and 1.1–1.4 times as long as wide. An additional, subtle difference is that in *C. brevior*, the perigynium body is abruptly contracted to a relatively narrow beak, whereas in *C. longii* the body tapers more gradually to a wide beak. Nevertheless, incomplete or immature specimens can be difficult to determine with certainty.

A somewhat similar species, *Carex brittoniana* L. H. Bailey, is frequent locally in Texas, where it occurs along the Rio Grande even as far south as the vicinity of Brownsville. It seems almost certain that it occurs also in northernmost Tamaulipas. The perigynia have \pm orbicular bodies similar in shape to *C. brevior*, but are much larger, (5.5–) 6–8.3 mm long and 3.7–6 mm wide, and have longer beaks 1.5–3.4 mm long. The key in Jones and Reznicek (1991) provides further distinctions.

3. *Carex curviculmis* Reznicek, sp. nov.—TYPE: MEXICO. México: Vertiente SW del Ixtaccfhuatl, La Joya, Cañada de Alcalican, 1 Nov 1965, *Rzedowski 21567* (holotype: MEXU!; isotypes: DS! ENCB! LL! MICH! TEX! US! VDB! WIS!). Figs. 1c, 2c.

Plantae laxe cespitosae vel \pm coloniales; culmi fertiles 7–55 cm alti; vaginae basales pallide brunneae, glabrae. Folia 3–8; laminae 3–18 cm longae, 1–3 mm latae; vaginae ca. 1–6 mm longae, ventraliter albido-hyalinae, glabrae; ligulae 1–3.2 mm longae. Inflorescentiae 0.9–2 cm longae; spicae gynaeandreae, ovoideae, 4.8–12 mm longae, bractae infimae glumaceae vel setaceae, 0.4–0.8 (–1.6) cm longae. Perigynia (4–) 4.3–5.4 mm longa, 1.4–1.8 mm lata, 2.6–3.3plo longiora quam latiora, ascendencia, planoconvexa, corporibus ellipticis, 2.8–4 mm longis, 1.8–2.3plo longioribus quam latioribus, in rostrum serrulatum 1.3–1.5 (–1.7) mm longum attenuata. Achenium 1.7–2 mm longum, (1.1–) 1.2–1.4 mm latum, planoconvexum. Styli marcescentes; stigmata 2. Antherae 3, 1.4–2.7 mm longae.

Loosely cespitose or \pm colonial in small patches by short-creeping rhizomes, rhizomes up to 7 mm long between shoots; fertile culms 7–55 cm tall, stiff but arcuate to \pm nodding, trigonous, smooth except just below inflorescence, where finely scabrous-angled; bladeless basal sheaths pale brown, \pm persistent. Leaves 3–8, on the lower 1/10–1/3 of the culm; blades 3–18 cm long, 1–3 mm wide, plicate, glabrous, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 1–6 cm long, tightly enveloping culms, glabrous, green; the inner band of sheaths

glabrous, whitish hyaline, sometimes prolonged up to 1 mm beyond the leaf bases, the apex concave, whitish hyaline; ligules 1–3.2 mm long, rounded, the free portion entire, up to 0.3 mm long. Vegetative culms ca. 1–6 cm tall with 5–10 leaves; leaves tristichous and mostly clustered in the upper 1/2 of the culm. Inflorescences 0.9–2 cm long, capitate-ovoid, the upper spikes overlapping, the lowest two spikes 1.5–6 mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or occasionally setaceous, 0.4–0.8 (–1.6) cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes 3–5 (–6), gynaeceandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, ovoid, 4.8–12 mm long, pistillate portion 4–9.5 mm long, 3.5–5 mm wide, ca. 5–20-flowered, staminate portion 0.8–2.5 mm long, appressed against pistillate portion, ca. 1–4-flowered. Pistillate scales 3.2–4.3 mm long, 1.6–2.3 mm wide, ovate, acute, reddish brown with a narrow green center and narrow hyaline margins, 1–3-nerved. Staminate scales ca. 3.5–4.6 mm long, ca. 1.4–2.2 mm wide, narrowly ovate, acute to acuminate, reddish brown with a narrow green center and hyaline margins, 1–3-nerved. Perigynia (4–) 4.3–5.4 mm long, 1.4–1.8 mm wide, 2.6–3.3 times as long as wide, ascending, plano-convex with elliptic bodies 2.8–4 mm long, 1.8–2.3 times as long as wide and 1.7–2.9 times as long as the beak, widest 1.4–1.9 mm above base, narrowly and thickly winged and serrulate-margined above the widest point, the wings \pm arched forward, gradually tapered into a beak, green to pale brown, glabrous, sessile, adaxial side nerveless or faintly 1–5-nerved over achene, abaxial side faintly (0–) 1–9-nerved over achene; beaks 1.3–1.5 (–1.7) mm long, strongly flattened and serrulate-margined but with the apical 0.3–0.6 mm terete and smooth, the apex obliquely bidentate with scabrous-margined teeth up to 0.4 mm long. Achenes 1.7–2 mm long, (1.1–) 1.2–1.4 mm wide, 1.2–1.6 times as long as wide, biconvex, ovate-oblong, pale brown, short-stipitate; style essentially straight; stigmas 2. Anthers 3, 1.4–1.8 (–2.7) mm long. Chromosome number unknown.

An uncommon species of moist alpine meadows, streambanks, and open moist conifer forests at 3000–4000 (–4600?) m in the Transvolcanic Belt, with one station known in Chiapas (Fig. 3). This is a species of the upper slopes of the high volcanos, occurring on Volcán Ixtaccíhuatl, Volcán Tacaná, and the Nevado de Toluca, with one station at Palomas in the State of México. Fruiting specimens have been collected from July through February.

ADDITIONAL SPECIMENS EXAMINED. CHIAPAS: Mpio. Unión Juárez, SE side of the summit of Volcán Tacaná, 10 Nov 1972, *Breedlove 29327* (CAS, MICH, TEX).—MÉXICO: Mpio. Ixtapalaca, N slope of Volcán Ixtaccíhuatl, main road from hwy to Estación Experimental Zoquiapan, 8 km S of Río Frío, 8 Oct 1983, *Anderson 12948* (MICH); Iztaccíhuatl, NW side of mtn, ca. 9 km E of San Rafael, 16 Jul 1959, *Beaman 2849* (MSC); SW slopes of Volcán Ixtaccíhuatl ca. 8 km N of Paso de Cortés, 26 Feb 1988, *Reznicek 8118* & *Reznicek* (MICH); W slopes of Nevado de Toluca, 35 km (road) SW of Toluca on hwy 130, 29 Aug 1965, *Roe et al. 1475* (ENCB, US, WIS); Mpio. Chalco, Llano Grande, km 54 carretera México-Puebla, 26 Jul 1964, *Rzedowski 18465* (MICH, MSC; mixed with *C. orizabae*); Mpio. Iturbide, Palomas, 8 Aug 1968, *Rzedowski 25929* (DS, MICH, both mixed with *C. peucophila*; MSC, ENCB); Mpio. Amecameca, La Joya de Alcalicán, extremo SSW del Ixtaccíhuatl, 13 Nov 1977, *Rzedowski 35545* (VDB), 2 May 1980, *Rzedowski 36654a* (ENCB); La Ciénega, región de Peñas Cuatas, cerca de la Cabeza del Iztaccíhuatl, 14 Jan 1981, *Rzedowski 37192* (ENCB); 55 km SE of Mexico City, 13 Jul 1942, *Weaver 779* (NY).—PUEBLA: S slope of Volcán Ixtaccíhuatl, 23 Oct 1966, *Hermann 20849* (MICH, US).

Endemic to Mexico, as far as known, *Carex curviculmis* resembles *C. peucophila* rather closely, and has been included with it by all past authors. There is, however, an apparently real discontinuity in morphology between the two; the

longer, narrow perigynia (4-) 4.3-5.4 mm long and 2.6-3.3 times as long as wide, and longer beaks 1.3-1.5 (-1.7) mm long set off *C. curviculmis* relatively clearly. In *C. peucophila*, the perigynia are (3.3-) 3.5-4.4 (-4.7) mm long and 1.8-2.4 (-2.6) times as long as wide with a shorter beak 0.6-1.2 (-1.5) mm long. The two species are similar in habit with short-creeping rhizomes and arching or curved fertile culms, and immature or depauperate specimens can be difficult or impossible to determine. The culms of *C. curviculmis* are generally stiffer and thicker, but there is overlap in this feature. The epithet *curviculmis* alludes to the arching or curved culms typical of this species.

Whereas *C. peucophila* has an extremely wide altitudinal range from (2000-) 2400-3800 (-3950) m, *C. curviculmis* is apparently confined to elevations above 3000 m. One collection, *Hermann 20849*, gives an elevation of 15000 ft (4600 m), but this seems too high, as it would place the species virtually at the snowline on the barren volcanic ash fields. A single mixed collection has been seen, indicating that the two can grow together in the same habitat. *Rzedowski 36654a*, tentatively placed here, is too immature to be determined with absolute certainty.

4. *Carex festivelloides* Reznicek, sp. nov.—Type: MEXICO, Chihuahua: Sierra Madre, 3 Oct 1887, *Pringle 1402* (holotype: MEXU!; isotypes: F! GH! MICH! NY-2 sheets! RSA! US! WIS!). Figs. 1d, 2d.

Plantae dense cespitosae; culmi fertiles 15-50 cm alti; vaginae basales pallide brunneae, glabrae. Folia 3-5; laminae 3-20 cm longae, 1.3-3.2 mm latae; vaginae ca. 2.5-7 mm longae, ventraliter albido-hyalinae, glabrae; ligulae 1.3-3.2 mm longae. Inflorescentiae 1-2.3 cm longae; spicae gynaeandreae, ovoideae, 4.5-11.5 mm longae, bracteae infimae laminae 1.2-6 (-8) cm longis, ca. 2 mm latis, evaginatis. Perigynia (3.8-) 4.3-5.8 mm longa, (1.3-) 1.5-1.9 mm lata, 2.7-3plo longiora quam latiora, ascendunt, planoconvexa, corporibus ellipticis, 2.8-3.8 mm longis, 1.9-2.2plo longioribus quam latioribus, in rostrum serrulatum 1.3-1.6 mm longum contracta. Achenium 1.7-2 mm longum, 1-1.3 mm latum, planoconvexum. Styli marcescentes; stigmata 2. Antherae 3, 1.6-2.8 mm longae.

Cespitose in dense clumps; fertile culms 15-50 cm tall, erect, trigonous, smooth except just below inflorescence, where finely scabrous-angled; bladeless basal sheaths pale brown, ± persistent. Leaves 3-5, on the lower 1/6-1/3 of the culm; blades 3-20 cm long, 1.3-3.2 mm wide, plicate, glabrous, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 2.5-7 cm long, tightly enveloping culms, glabrous, green; the inner band of sheaths glabrous, whitish hyaline, sometimes prolonged up to 1 mm beyond the leaf bases, the apex concave, whitish hyaline; ligules 1.3-3.2 mm long, rounded, the free portion entire, up to 0.4 mm long. Vegetative culms, ca. 3-6 cm tall with 4-9 leaves; leaves tristichous and mostly clustered in the upper 1/2 of the culm. Inflorescences 1-2.3 cm long, ± capitate-ovoid, but with the spikes usually distinct but strongly overlapping, the lowest two spikes ca. 1-5 mm distant, spikes single at nodes, sessile, lowermost bracts setaceous to ± leafy, 1.2-6 (-8) cm long and up to ca. 2 mm wide, conspicuous, sheathless but dilated at base, the upper bracts much reduced; spikes (2-) 3-6 (-8), gynaeandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, ovoid, 4.5-11.5 mm long, pistillate portion 5-11 mm long, 4-8.5 mm wide, (4-) 7-20-flowered, staminate portion 0.5-1 mm long, appressed against the pistillate portion, 1-3-flowered. Pistillate scales 3.2-4.5 mm long, 1.4-2.1 mm wide, ovate, acute, reddish brown with a narrow green center

and hyaline margins, 1-nerved. Staminate scales ca. 2.9–3.6 mm long, 1.5–2.3 mm wide, ovate, acute, reddish brown with a narrow green center and hyaline margins, 1-nerved. Perigynia (3.8–) 4.3–5.8 mm long, (1.3–) 1.5–1.9 mm wide, 2.7–3 times as long as wide, ascending, plano-convex and strongly flattened with elliptic bodies 2.8–3.8 mm long, 1.9–2.2 times as long as wide, and 2.1–2.4 times as long as the beak, widest 1.3–1.9 mm above base, broadly thin-winged and serrulate-margined except near base, tapered into a beak, green to pale brown, glabrous, sessile, adaxial side nerveless or nearly so over achene, abaxial side faintly (0–) 3–7-nerved over achene; beaks 1.3–1.6 mm long, strongly flattened and serrulate-margined to apex, the apex bidentate with scabrous-margined teeth up to 0.5 mm long. Achenes 1.7–2 mm long, 1–1.3 mm wide, 1.5–1.8 times as long as wide, biconvex, ovate-oblong, pale brown, short-stipitate; style essentially straight; stigmas 2. Anthers 3, 1.6–2.8 mm long. Chromosome number unknown.

Known only from the type, collected in "Moist soil," presumably in an alpine meadow, at 2900 m in Chihuahua (Fig. 3). Fruit was mature in early October. Pringle does not give a specific locality on the label, but from September 10 to October 11, 1887, he was encamped a few miles south of Ciudad Guerrero, in central Chihuahua. The type was gathered from "the summit five or six miles from camp, and 9500 feet above sea level by my aneroid" (Davis 1936).

Pringle 1402 is a paratype of *C. egglestonii* var. *festivelliformis* F. J. Herm., but Hermann's (1960) concept of his variety was confounded by the fact that it was based on two different species; the type belongs with *C. wootonii*. *Pringle 1402*, much more than the type, does superficially resemble plants called *C. festivella* from the Rocky Mountains (hence the epithet *festivelloides*) and was so annotated and reported by Mackenzie (1931). *Carex festivella* was considered merely a robust southern form of *C. microptera* by Whitkus and Packer (1984), but in any event, several characters separate *C. festivelloides* clearly. *Carex festivelloides* apparently has consistently elongated lower inflorescence bracts, perigynium beaks flattened and serrulate-margined virtually to the prominently bidentate apex, and achenes 1–1.3 mm wide. The "*C. festivella*" form of *C. microptera* lacks consistently elongated lower inflorescence bracts, has perigynium beaks terete and smooth apically, and has achenes only ca. 0.8–1 mm wide. *Carex festivelloides* differs dramatically from *C. egglestonii* Mack. in having much smaller and narrower perigynia.

Because of the elongated lower inflorescence bracts, *C. festivelloides* might be thought to be close to *C. athrostachya*, but the bract character appears to be a convergence. *Carex athrostachya* has terete beak apices that are barely bidentulate, narrower, smaller perigynia and achenes (see key), and shorter anthers, among other differences. If individuals of *C. festivelloides* that lack elongated lower inflorescence bracts were found, they would key here to *C. curviculmis*, from which they could be separated by their densely cespitose habit, erect fertile culms, broadly thin-winged perigynia, and usually longer anthers 1.6–2.8 mm long. *Carex curviculmis* has a loosely cespitose habit, with the rhizomes short-creeping, arcuate to \pm nodding fertile culms, narrowly thick-winged perigynia, and usually shorter anthers 1.4–1.8 (–2.7) mm long.

5. *Carex interjecta* Reznicek, sp. nov.—TYPE: MEXICO, Morelos: near lagoons in Lagunas de Zempoala National Park, 29 Jul 1987, *Freudenstein 2178* (holotype: MICH!). Figs. 1c, 2c.

Plantae dense cespitosae; culmi fertiles 40–60 cm alti; vaginae basales pallide brunneae, glabrae. Folia ca. 4–5; laminae ca. 5–20 cm longae, ca. 1.8–3.2 mm latae; vaginae ca. 2–6 mm longae, ventraliter albido-hyalinae, glabrae; ligulae 2.5–5.5 mm longae. Inflorescentiae 2.5–3.5 cm longae; spicae gynaeandreae, ovoideae, 6–11 mm longae, bracteae infimae glumaceae vel setaceae, 0.8–3 cm longae. Perigynia (3.5–) 3.7–4.5 mm longa, 1.3–1.8 mm lata, 2.2–2.6plo longiora quam latiora, adpressa, ± biconvexa, corporibus ellipticis vel aliquantum obovoideis, 2.4–3 mm longis, 1.5–1.8plo longioribus quam latioribus, in rostrum serrulatum 1.1–1.5 mm longum contracta. Achenium ca. 1.4–1.7 mm longum, ca. 0.9–1.1 mm latum, biconvexum. Styli marcescentes; stigmata 2. Antherae 3, ca. 1.2–1.5 mm longae.

Cespitose in small clumps; fertile culms 40–60 cm tall, erect, trigonous, smooth except just below inflorescence, where finely scabrous-angled; bladeless basal sheaths pale brown, rapidly disintegrating. Leaves ca. 4–5, on the lower 2/5–2/3 of the culm; blades ca. 5–20 cm long, ca. 1.8–3.2 mm wide, plicate, glabrous, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 2–6 cm long, tightly enveloping culms, glabrous, green; the inner band of sheaths glabrous, whitish hyaline, sometimes prolonged up to 1.5 mm beyond the leaf bases, the apex concave, whitish hyaline; ligules 2.5–5.5 mm long, rounded, the free portion entire, up to 0.4 mm long. Vegetative culms unknown. Inflorescences 2.5–3.5 cm long, elongate, the upper spikes overlapping, the lowest two spikes 3–9 mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or sometimes setaceous, 0.8–3 cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes 6–9, gynaeandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, ovoid, 6–11 mm long, pistillate portion 5–9 mm long, 3.5–5 mm wide, ca. 12–50-flowered, staminate portion 1–2.5 mm long, ca. 1.5 mm wide, ca. 1–3-flowered. Pistillate scales 2.8–3.8 mm long, 1.4–1.7 mm wide, ovate, obtuse to acute, reddish brown with a narrow green center and narrow hyaline margins distally, 1-nerved. Staminate scales 2.4–3.1 mm long, ca. 1.4–2.1 mm wide, ovate, acute, reddish brown with a narrow green center and hyaline margins, 1–3-nerved. Perigynia (3.5–) 3.7–4.5 mm long, 1.3–1.8 mm wide, 2.2–2.6 times as long as wide, appressed, ± biconvex with elliptic to somewhat obovate bodies 2.4–3 mm long, 1.5–1.8 times as long as wide, and 1.8–2.6 times as long as the beak, widest ca. 1.5–1.7 mm above base, broadly winged and serrulate-margined above the widest point, the wings somewhat arched forward, tapered into a beak, green to pale brown, glabrous, sessile, adaxial side faintly 1–5-nerved over achene, abaxial side faintly 3–9-nerved over achene; beaks 1.1–1.5 mm long, strongly flattened and serrulate-margined but with the apical 0.2–0.4 mm ± terete and smooth, the apex oblique. Achenes ca. 1.4–1.7 mm long, ca. 0.9–1.1 mm wide, ca. 1.5–1.7 times as long as wide, biconvex, narrowly ovate-oblong, pale brown, short-stipitate; style essentially straight; stigmas 2. Anthers 3, ca. 1.2–1.5 mm long. Chromosome number unknown.

Known only from the type, collected in a moist meadow in Morelos at approximately 2900 m (no elevation given with the specimen) (Fig. 3). Only a few culms on the holotype were fully mature at the end of July, so peak fruiting probably would have been in August.

Carex interjecta is an enigmatic plant that is quite different from other Mexican (and United States) members of section *Ovales*. In aspect, its inflorescences look quite like those of *C. longii*: ± elongate, with ascending, ovoid spikes of appressed perigynia. It also has leafy culms like those of *C. longii* (and *C. tribu-*

loides) with the leaves occurring to 2/5–2/3 of the way up the culm. However, these features are juxtaposed with characteristics typical of most or all the other species of the section found in Mexico, including hyaline inner bands to the sheaths, narrow leaves (1.8–3.2 mm wide), and reddish brown pistillate scales. The epithet *interjecta*, “thrust between,” alludes to this juxtaposition of features. The affinities of this evidently uncommon plant are uncertain.

6. *Carex lagunensis* M. E. Jones, Contr. W. Bot. 18: 26. 23 Aug 1933.—TYPE: MEXICO. Baja California Sur: The Laguna, Laguna Mountains, 22 Sep 1930, Jones 27592 (holotype: POM!). Figs. 1f, 2f.

Carex diehlii M. E. Jones ex F. J. Hermann, Amer. Midl. Naturalist 51: 268. 1954.—TYPE: MEXICO. Chihuahua: Meadow Valley, Sierra Madre Mts, 17 Sep 1903, Jones s.n. (holotype: POM!).

Densely caespitose in small clumps; fertile culms 15–80 cm tall, stiffly erect, trigonous, smooth except just below inflorescence, where finely scabrous-angled; bladeless basal sheaths pale brown, \pm persistent. Leaves 4–8, on the lower 1/7–1/3 of the culm; blades 4–27 cm long, 1.5–4.8 mm wide, plicate, glabrous, coriaceous, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 2–10 cm long, tightly enveloping culms, glabrous, green; the inner band of sheaths glabrous, whitish hyaline, sometimes prolonged up to 1.5 mm beyond the leaf bases, the apex concave, whitish hyaline; ligules 1.2–3.5 mm long, rounded, the free portion \pm entire, up to 0.4 mm long. Vegetative culms poorly known, ca. 2–8 cm tall with ca. 7–10 leaves; leaves tristichous and mostly clustered in the upper 1/2 of the culm. Inflorescences 1.2–2.5 (–3.5) cm long, stiffly erect in a dense to \pm loose head, the upper spikes overlapping, the lowest two spikes 1.5–9 mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or setaceous, rarely the lowermost leafy, 0.5–1.5 (–6) cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes (3–) 4–8 (–10), gynaeandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, ovoid, 7–12 mm long, pistillate portion 4–11 mm long, 5–8 mm wide, 8–35-flowered, staminate portion 1–2.5 mm long, appressed against the base of the pistillate portion, ca. 1–4-flowered. Pistillate scales 3.5–4.6 mm long, 1.5–2.5 mm wide, ovate, acute, yellowish brown to reddish brown with a narrow green center and narrow hyaline margins, 1 (–3)-nerved. Staminate scales 3.3–4.8 mm long, 1.5–2.5 mm wide, ovate, acute to acuminate, yellowish brown to reddish brown with a narrow green center and hyaline margins, 1 (–3)-nerved. Perigynia (3.5–) 4.3–5.4 mm long, (1.6–) 2–2.6 (–2.8) mm wide, 1.7–2.2 (–2.6) times as long as wide, ascending, plano-convex with elliptic to \pm suborbicular bodies 2.7–4.1 mm long, 1.2–2 times as long as wide and (2.2–) 2.5–4 times as long as the beak, widest 1.3–2.1 mm above base, thickly and narrowly winged and serrulate-margined above the widest point, the wings arched forward, tapered into a beak, green to pale brown, glabrous, coriaceous, sessile, adaxial side nerveless or up to faintly 7-nerved over achene, abaxial side \pm faintly 3–9-nerved over achene; beaks 0.8–1.2 (–1.5) mm long, strongly flattened and serrulate-margined to apex, the apex irregularly bidentulate with scabrous-margined teeth up to 0.3 mm long. Achenes 1.6–2.4 mm long, 1.2–1.7 mm wide, 1.2–1.6 times as long as wide, biconvex, broadly ovate-oblong, pale brown, short-stipitate; style essentially straight; stigmas 2. Anthers 3, (1.6–) 1.8–2.8 mm long. Chromosome number unknown.

A species of wet meadows, streambanks, marsh edges, and seepy slopes in pine-oak forest at 1900–3100 m occurring from southern Baja and Chihuahua

south along the Sierra Madre Occidental to the Distrito Federal and the State of México (Fig. 4). Fruiting occurs from July through November.

ADDITIONAL SPECIMENS EXAMINED. BAJA CALIFORNIA SUR: Sierra de la Laguna, 24 Jan [1890], *Brandegee s.n.* (UC); 19 Oct 1893, *Brandegee s.n.* (UC); S of Pico La Aguja, Sierra La Laguna, 22 Oct 1977, *Breedlove 43276 & Axelrod* (CAS, MEXU, MO); *Breedlove 43393 & Axelrod* (CAS, MEXU).—CHIHUAHUA: Majalca, 24 Jun 1936, *LeSueur 1103* (F, GH, TEX); Rio Tomochik, along route 14, 10 miles W of town, 9 Jun 1976, *Pinkava 13252* (MSC); Mpio. Bocoyna, cjido de San Ignacio Ararcco, 2 Aug 1977, *Weber & Bye 7832* (GH, MEXU, MICH, SD).—DISTRITO FEDERAL: Lomas de San Angel, Jul 1930, *Lyonnet 723* (CAS, MEXU, US); Delegación de Villa A. Obregón, 3 km al SW de Santa Fé, 6 Oct 1968, *Rzedowski 26329* (CAS); Delegación de Cuajimalpa, Desierto de los Leones, 9 Jul 1944, *Sharp & Gilly 19* (MICH).—DURANGO: Mpio. Pueblo Nuevo, alrededores de Coyotes, 21 Aug 1981, *González E. & Rzedowski 1889* (ENCB); Mpio. El Salto, alrededores del Mil Diez, 2 km al N de El Salto, 27 Jun 1982, *Hernández 7449 & Tenorio* (MEXU); Mpio. El Salto, 4 km al E de El Salto, 1 Jul 1982, *Hernández 7512 & Tenorio* (MEXU, RSA); along Devil's Backbone of Sierra Madre Occidental, 98 road miles NE of Mazatlán on Mex. 40 or 39 road miles SW of El Salto, 23°41'N, 105°42'W, 21 Jul 1969, *Marcks & Marcks 1209* (LL, WIS); about 5 miles N of railroad at Coyotes, 8 Aug 1955, *Maysilles 8283* (MICH); El Salto (Aserraderos), Sierra Madre Occidental, 28 Aug 1934, *Pennell 18369* (MEXU, US); Mpio. El Salto, "El Capulin," 4 km al NE de El Pueblo de 1010, 28 Jun 1982, *Tenorio L. 699 & Romero T.* (MICH, MO); Mpio. El Salto, 1 km al SW de El Salto, 9 Jul 1982, *Tenorio L. 943 & Romero T.* (ENCB, MEXU, MICH, MO); 5 1/2 mi E of El Salto, 12 Aug 1957, *Waterfall 13592 & Wallis* (US).—MÉXICO: Mpio. Huixquilucan, 2 km al N de Santiago, sobre el camino a Dos Rios, 20 Nov 1979, *González E. 1144* (VDB); Mpio. Ixtapaluca, Estación Experimental de Investigación y Enseñanza de Zoquiapan, 8 km al SW de Río Frío, 28 Aug 1978, *Vega 426* (F, MEXU).—MORELOS: near lagoons in Lagunas de Zempoala National Park, 29 Jul 1987, *Freudenstein 2174* (MICH).

Carex lagunensis, as here recognized, is a Mexican endemic characterized by stiffly erect culms and large, wide, coriaceous perigynia (3.5–) 4.3–5.4 mm long, (1.6–) 2–2.6 (–2.8) mm wide, and 1.7–2.2 (–2.6) times as long as wide. Hermann (1974) recognized *Carex diehlii* as a Chihuahuan endemic, but treated *C. lagunensis* as a synonym of *C. peucophila*. Plants from Baja and Chihuahua, however, are quite similar, and distinguishable from *C. peucophila* as noted in the key. In addition, culms of *C. peucophila* are lax and flexuous whereas those of *C. lagunensis* are stiff and erect. *Carex lagunensis* is typically a larger and wider-leaved plant.

Carex lagunensis is perhaps most similar in aspect to *C. multicosata* Mack. of the western United States and may be a close relative of that species. *Carex multicosata* differs in generally having longer perigynium beaks (1.4–2 mm long) and perigynia that are usually finely but distinctly 8–12-nerved over the achene adaxially. *Carex lagunensis* has perigynia with beaks 0.8–1.2 (–1.5) mm long and nerveless or with up to 7 faint nerves over the achene adaxially.

Plants from the Distrito Federal and the State of México occur at higher elevations and are often larger and have darker scales than plants from Chihuahua and Baja, but have very similar perigynia. These plants were often determined as *C. peucophila* or sometimes *C. egglestonii* var. *festivelliformis*, but González E. (1990) noted, under *C. peucophila*, that they were similar to *C. lagunensis*. Durango collections are somewhat intermediate. More collections are needed to assess the significance of this variation. Somewhat immature specimens of *C. lagunensis* can often be recognized by the combination of numerous spikes (usually more than 5), large anthers mostly 1.8–2.8 mm long, caespitose habit, and geographical location. *Pinkava 13252* and *Tenorio L. 999 & Romero T.* are too immature for certain determination.

The two Mexican specimens referred by Hermann (1974) to *Carex xerantica* L. H. Bailey, *Maysilles 8283* and *Waterfall 13592 & Wallis* belong here. *Carex xeran-*

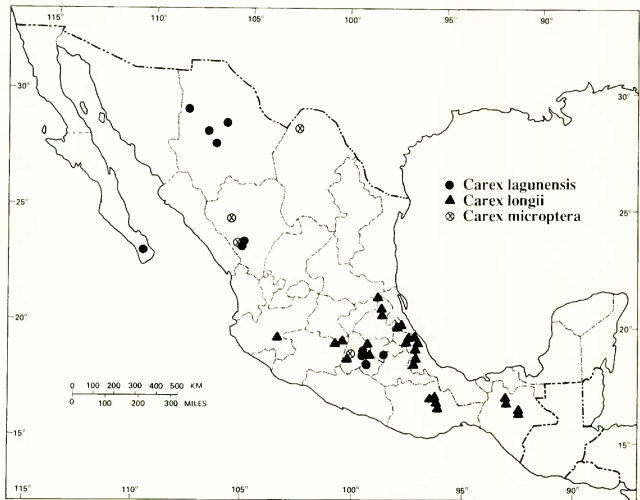


FIG. 4. Distribution of *Carex lagunensis*, *C. longii*, and *C. microptera*.

tica has pistillate scales essentially completely covering the perigynia and a pale inflorescence due to the very wide hyaline margins of the pistillate scales. *Waterfall 13592 & Wallis* clearly has pistillate scales shorter and narrower than the perigynia; *Maysilles 8283* is very immature, so the perigynia are concealed by the scales, but the hyaline margins to the pistillate scales are narrow.

7. *Carex longii* Mackenzie, Bull. Torrey Bot. Club 49: 373. 1923 [1922].—TYPE: U.S.A. New Jersey: Cape May Co., Cold Spring, 24 Jul 1907, *Long s.n.* (holotype: PH). See Rothrock (1991) for typification. Figs. 1g, 2g.
Carex leporina var. *bracteata* Liebmman, Mex. Halvgr. 76. 1850.—TYPE: MEXICO. Puebla: Huitamalco, 1841, *Liebmann s.n.* (lectotype, here designated; C; isolectotypes: GH! K! P!). Mackenzie (1931) noted "Type from Vera Cruz, Mexico" after his listing of this name in synonymy, but he did not specify which of the two Veracruz specimens Liebmman listed should be the lectotype, nor did he examine any Liebmman material from Veracruz, since apparently only the Puebla sheet is represented in North American herbaria.

Cespitose in small clumps; fertile culms (15–) 30–90 (–140) cm tall, ± erect to often lax and widely spreading, trigonous, smooth; bladeless basal sheaths pale brown, rapidly disintegrating and often absent. Leaves 4–6, on the lower (1/4–) 1/3–3/5 of the culm; blades 5–30 cm long, 1.5–4 (–4.5) mm wide, plicate, glabrous, the margins antrorsely scabrous; leaf sheaths ca. 3–11 cm long, tightly enveloping

culms, glabrous, green and sometimes white-mottled; the inner band of sheaths glabrous or often finely papillose near apex, green with at most a very short, rapidly tapering hyaline zone at the apex (the lower sheaths sometimes with a longer hyaline zone), not or at most slightly prolonged up to 0.5 mm beyond the leaf bases, the apex concave, whitish; ligules 2–6 mm long, rounded, the free portion entire, up to 0.5 mm long. Vegetative culms ca. 30–100 cm tall, annual or sometimes perennating and rooting at the nodes if contacting the soil, leaves ca. 7–15, tristichous and mostly loosely clustered in the upper 1/3 of the culm. Inflorescences (1.4–) 2.2–6 cm long, the upper spikes overlapping, the lowest two spikes 4–14 mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or sometimes setaceous, 0.4–7.5 cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes 2–8, gynaeceandrous; terminal spikes often slightly larger than the lateral but otherwise essentially similar, ovoid to clavate-ovoid, 6–17 mm long, pistillate portion 4.5–12 mm long, 4–7.5 mm wide, ca. 10–80-flowered, staminate portion 1–2 (–5.5) mm long, 1–1.5 mm wide, ca. 1–5 (–10)-flowered. Pistillate scales 2.2–3.7 mm long, 1.1–1.8 mm wide, ovate, obtuse to acute, whitish hyaline to pale silvery brown with a green center, 3-nerved. Staminate scales ca. 2.5–5.1 mm long, ca. 1.3–1.8 mm wide, narrowly ovate, acute to acuminate, whitish hyaline to pale silvery brown with a green center, 3-nerved. Perigynia 3–4.6 mm long, 1.6–2.8 mm wide, (1.3–) 1.6–2.2 times as long as wide, appressed, \pm biconvex with broadly obovate to \pm suborbicular bodies 2.5–3.7 mm long, (1–) 1.2–1.6 times as long as wide, and 2.4–4.1 times as long as the beak, widest ca. 1.4–2 mm above base, broadly winged and serrulate-margined except near base, gradually tapered into a wide beak, green to pale silvery brown, glabrous, sessile, adaxial side 3–9-nerved over achene, abaxial side 5–13-nerved over achene; beaks 0.7–1.3 mm long, strongly flattened and serrulate-margined to apex, the apex obscurely bidentulate with scabrous-margined teeth up to 0.4 mm long. Achenes 1.4–1.7 mm long, 0.8–1.1 mm wide, 1.5–1.7 times as long as wide, biconvex, narrowly ovate-oblong, pale brown, short-stipitate; style straight to slightly sinuous; stigmas 2. Anthers 3, (0.9–) 1.3–2.3 mm long. Chromosome number unknown.

A locally frequent plant, especially in moister areas of Mexico, primarily from southernmost San Luis Potosí to Chiapas along the Sierra Madre Oriental, but with scattered stations elsewhere (Fig. 4.) A species of roadsides, ditches, seepy slopes, streambanks, lakeshores, wet to mesic pastures and meadows, and wet to mesic clearings in forests and forest edges from (500–) 1200–2800 m. One of the weedier species of *Carex* in Mexico, often appearing in recently disturbed ditches and on the shores of reservoirs. Flowering and fruiting occur essentially throughout the year.

SPECIMENS EXAMINED. CHIAPAS: 2 km N of Jitotol on road to Pichucalco, 20 Oct 1983, *Anderson 13246* (MICH); Mpio. Chamula, 8 miles N of Chamula along road to Chenalho, 19 Jan 1965, *Breedlove 8160 & Raven* (DS, MICH); Mpio. Tenejapa, near crest of ridge in the paraje of Banabil, 10 Oct 1965, *Breedlove 12944 & Raven* (DS, MICH, WIS); Mpio. Jitotol, about 12 km north of Jitotol, 28 Oct 1971, *Breedlove 21479 & Thorne* (DS, NY); Mpio. Tenejapa, Paraje Kurus ch'en, 29 Sep 1972, *Breedlove 28216* (CAS, ENCB, NY); 2 1/2 miles N of Pueblo Nuevo Solist., 22 Jun 1965, *Lathrop 5886* (CAS, RSA, US); Mpio. Tenejapa, at the Paraje Matsab, 12 May 1966, *Ton 940* (DS, F, LL, MICH, MO, RSA).—DISTRITO FEDERAL: Tlalpan, 9 Dec 1892, *Pringle 5211* (MEXU).—HIDALGO: Mpio. Molango, margin of Lake Atexca below Molango, 9 Nov 1946, *Moore 1942* (GH); 5 km al N de Tlanchinol, sobre la carretera a Huejutla, 21 Sep 1972, *Rzedowski & Madrigal 29413* (ENCB).—JALISCO: Mpio. Gómez Farías, Presa de los Cangrejos, 14 km NE of San Andrés, Dec 1989, *Villa C. et al. 419* (CHAPA, MICH).—MÉXICO: Presa Tilostoc, 18 Jul 1965, *Lachica et al. Fal-1786* (ENCB); 2 km al W de Cuautitlán, sobre la autopista México-Querétaro, 1 May 1973, *Rzedowski 30472*

(ENCB).—MICHUACÁN: Parc San Pedro, vicinity of Morelia, Jul 1909, *Arsène 3031* (GH, ILL, MICH, MO, NY, P, US); Jardín du College, vicinity of Morelia, 27 Jul 1909, *Arsène 3283* (US); Parc San Pedro, vicinity of Morelia, 19 Mar 1909, *Arsène 9909* (US); SE side Morelia along Avc. Ventura Puente, 17 Aug 1966, *Kral 27681* (ENCB, VDB); 14 km al E de Queréndaro, sobre la carretera a Maravatio, 15 Feb 1987, *Rzedowski 42466* (ENCB); Mpio. Morelia, alrededores del balneario Cointzio, ca. de La Mintzita, 9 Jul 1987, *Rzedowski 43571* (ENCB, MICH, XAL).—OAXACA: cerca de Llano de las Flores, 25 km de Ixtlán de Juárez, sobre el camino a Tuxtepec, 23 Oct 1977, *González E. 1020* (ENCB, MEXU); Mpio. Yolox, approx 1 km W of Yolox on the road between Yolox and Quiotepec, 20 Mar 1981, *Martin 444* (MEXU); 34.6 miles NE of Guelatao along hwy 175, 25 Dec 1975, *Reznicek & Gregory M-341* (MICH); Sierra de Juárez, along hwy 175, 1.5 km by road NE of Cerro Pelón, 21 Feb 1988, *Reznicek 8094 & Reznicek* (MICH); Sierra de Zempoaltepetl, 1.4 km SW of San Pedro y San Pablo Ayutla, 23 Feb 1988, *Reznicek 8111 & Reznicek* (MICH).—PUEBLA: km 184.7 de la carretera México-Tuxpan, 2 Nov 1966, *Cruz C. 1533* (ENCB); near Ococtoc, below Tezuiltan, 18 Aug 1945, *Sharp 45815* (GH, MEXU, NY).—SAN LUIS POTOSÍ: Mpio. Xilitla, 5 km al NE de Ejido de Xilitlilla, 5 May 1959, *Rzedowski 10546* (ENCB, MSC).—VERACRUZ: Orizaba, Sep 1856, *Botteri 187* (P); Ixhuatlancillo, près Orizaba, 4 Jul 1866, *Bourgeau 2588* (GH, K, P); Rancho Guadalupe jardín botánico a 3 km de Xalapa por la carretera vieja a Coatepec, 26 Jul 1976, *Castillo C. et al. 10* (F, XAL); La Calavera, carretera Altotonga-Tlapacoyan, 17 May 1973, *Chazaro & Dorantes 86* (ENCB); Mpio. Coatepec, 4 km Naolinco camino a Coatepec, 12 Aug 1983, *Diego 3615* (ENCB); Mpio. Coatepec, Consolapa, 26 Apr 1983, *Gutiérrez B. & Hernández P. 1325* (XAL); Mpio. Yecuatla, a 3 km NW de Yecuatla, camino Yecuatla-Leona Vicario, 28 Aug 1983, *Gutiérrez B. 1335* (XAL); *Gutiérrez B. 1349* (XAL); Mpio. Yecuatla, Santa Rita, carretera Xalapa-Misantla, 26 Apr 1976, *Hernández A. et al. 146* (F, WIS, XAL); ca. 4 km SSW of Xalapa, 10 Oct 1978, *Illis et al. 953* (WIS); along Río Frío below Tezuiltan, Jul 1950, *Johnston 53-669* (TEX, K); Mpio. Calcabualco, 2 km al NE de Calcabualco, Barranca de Jamapa, 14 May 1985, *Martínez & Espiritu 161* (XAL); Rancho Guadalupe, 3 km W de Jalapa, carretera vieja Jalapa-Coatepec, 23 Aug 1975, *Monroy et al. 57* (ENCB, XAL); 13 km N of Altotonga (19 km by road), on road to Tlapacoyan, vic. "Cerro del Aquila," 28 Jun 1980, *Nee & Hansen 18622* (F, MEXU, US, XAL); Jalapa, May 1829, *Schiede & Deppe* (BM, K-2 sheets); Mpio. Altotonga, Xoampolco, 2 Jan 1970, *Ventura A. 305a* (ENCB); Mpio. Atzalan, San Felipe, cerca de la Capilla, 11 May 1970, *Ventura A. 1066* (MEXU).—LOCALITY UNKNOWN: Mexico, 1835, *Müller 1972* (NY).

Carex longii is easily identified because of the combination of herbaceous, green sheaths and wide perigynia 1.6–2.8 mm wide and (1.3–) 1.6–2.2 times as long as wide with \pm obovate bodies. The pale color of the inflorescence caused by the green to pale silvery brown perigynia with whitish hyaline to pale silvery brown scales is distinctive once learned. *Carex longii* is widely but rather irregularly distributed in the eastern United States (Rothrock 1991). Its Mexican distribution is somewhat disjunct, with a gap from southern San Luis Potosí to eastern Texas. Elsewhere in the New World, *C. longii* is distributed throughout most of Central America, Bermuda, Cuba, Hispaniola, and northwestern South America south to Ecuador. Farther southeast in South America, from southeastern Brazil to Argentina, occurs the var. *meridionalis* (Kük.) G. A. Wheeler (Wheeler 1987), sometimes recognized as *C. meridionalis* (Kük.) Herter. The description above has been drawn entirely from Mexican material.

In older literature, *Carex longii* is usually united with *C. albolutescens* and reported under the latter name. The typification of *C. longii* and its separation from closely similar plants has been detailed by Rothrock (1991).

- 8. *Carex microptera* Mackenzie, Muhlenbergia 5: 56. 1909.**—TYPE: U.S.A. Nevada: Elko Co., Deeth, 21 Jul 1908, *Heller 9067* (holotype: NY; isotype: CAS). See Whitkus & Packer (1984) for typification. Figs. 1h, 2h.

Densely caespitose in small clumps; fertile culms 20–90 (–110) cm tall, erect, trigonous, smooth except below inflorescence, where finely scabrous-angled;

bladeless basal sheaths pale brown, \pm persistent. Leaves 4–8, on the lower 1/10–1/3 of the culm; blades (4–) 8–25 (–50) cm long, 1.8–3.5 (–5) mm wide, plicate, glabrous, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 2.5–12 cm long, tightly enveloping culms, glabrous, green; the inner band of sheaths glabrous, whitish hyaline, occasionally prolonged up to 1 mm beyond the leaf bases, the apex concave, whitish hyaline to pale brown; ligules 1.3–5 mm long, rounded, the free portion entire, up to 0.7 mm long. Vegetative culms 2–9 cm tall with ca. 6–11 leaves; leaves tristichous and mostly clustered in the upper 1/3 of the culm. Inflorescences 0.8–2.6 cm long, broadly ovoid with the spikes difficult to distinguish, the lowest two spikes 1–4 mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or occasionally setaceous, 0.5–1.2 (–8) cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes (3–) 5–9, gynaeceandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, 5.5–11 mm long, pistillate portion 5–10 mm long, 5–9 mm wide, ca. 15–60-flowered, staminate portion 0.5–2 mm long, appressed against the pistillate portion, ca. 1–5-flowered. Pistillate scales 2.4–4.1 mm long, 0.9–1.7 mm wide, narrowly ovate, acute, reddish brown to purplish brown with a narrow green center and hyaline margins, 1-nerved. Staminate scales 2.1–3.4 mm long, 0.9–1.7 mm wide, lanceolate to narrowly ovate, acute to acuminate, reddish brown to purplish brown with a narrow green center and narrow hyaline margins, 1-nerved. Perigynia (3–) 3.4–4.8 (–5.2) mm long, 1.2–1.9 (–2.4) mm wide, (2.3–) 2.5–3.4 times as long as wide, spreading-ascending, biconvex with elliptic bodies 2.1–3.5 mm long, 1.6–2.4 times as long as wide and 1.5–3 (–3.8) times as long as the beak, widest 0.8–1.8 mm above base, narrowly to broadly thin-winged and serrulate-margined above the widest point, tapered into a beak, green to pale brown, glabrous, sessile, adaxial side nerveless or occasionally faintly 1–5-nerved over achene, abaxial side 5–9-nerved over achene; beaks 1–1.5 (–2.1) mm long, strongly flattened and serrulate-margined but with the apical (0.2–) 0.4–0.7 mm \pm terete and smooth, the apex oblique or \pm bidentulate with teeth up to 0.3 mm long. Achenes 1.1–1.6 mm long, 0.8–1.1 mm wide, 1.3–1.6 times as long as wide, biconvex, elliptic-oblong, pale brown, short-stipitate; style essentially straight; stigmas 2. Anthers 3, 0.9–2.1 mm long. Chromosome numbers: $n = 40$ (Whitkus & Packer 1984; Whitkus 1991); $n = 41$ (Wahl 1940).

Evidently an uncommon and local species of streambanks, seepy banks, and wet meadows in pine-oak forest at 2100–2650 m, mostly along the Sierra Madre Occidental from Coahuila to the State of México (Fig. 4). Fruiting specimens have been collected from May through August.

SPECIMENS EXAMINED. COAHUILA: Mpio. Ocampo, Sierra Madre del Carmen, Cañón Dos, 28°59'N, 102°33'W, 28 May 1975, *Riskind & Patterson 1821c* (LL); Sierra el Carmen, ca. 20 air miles S of U.S. border, ca. 1 km N of Campo Dos in N-S running Cañón el Moreno (= Cn. Dos), 28°59'45"N, 102°36'45"W, 7 Jul 1989, *Spellenberg 9956* (MICH). —DURANGO: 7.5 mi SW Puerto Buenos Aires along Mex 40, 25 Aug 1965, *Kral 25693* (VDB); Mpio. Santiago Papasquiaro, on the road to Topia and Canelas, 142 km W of the junction with the road from Santiago Papasquiaro to Tepehuanes, 8 km W of El Ojito de Canellones, 19 km E of Cienega de la Nuestra Señora, 28 Jun 1992, *Spellenberg 11031 & Bacon* (MICH); Mpio. El Salto, 4.5 km al SW de El Salto, Brecha El Salto-Pueblo Nuevo, 3 Jul 1982, *Tenorio L. 793 & Romero T.* (MEXU, MICH, MO); 9.3 mi W of El Salto (at river) on Rte. 40, 20 Aug 1979, *Wagner & Solomon 4277* (MO, VDB). —MÉXICO: Mpio. Villa de Allende, Criadero "San Cayetano," 4 km al N de Agua Escondida, 20 Jun 1982, *Díaz P. 187* (MEXU).

This is the first report from Mexico of this very widespread western North American species distributed from southern Yukon and adjacent Northwest Terri-

tories to Manitoba and South Dakota south to California and New Mexico. *Carex microptera* is a member of the aggregate of species centered on the bipolar disjunct *C. mactoviana* (Type: [Falkland Islands], Is. Soledad, d'Urville 8, holotype: P!) (Moore & Chater 1971; Whitkus 1988; also Whitkus & Packer 1984, for typification) and is most similar in the Mexican flora to *C. orizabae*, an alpine plant primarily of the Transvolcanic Belt. *Carex microptera* has perigynia green to pale brown even when mature (the tip of the beak, however, sometimes darker), nerveless or only faintly nerved over the achene adaxially, and spreading-ascending in the spikes. The perigynia of *C. orizabae* are normally dark reddish brown to purplish black on the beak and distal portion of the body, ascending-appressed in the spikes, and usually clearly 1–6-nerved over the achene adaxially (the nerves often darker than the rest of the body). *Carex microptera* is densely caespitose, with very little tendency for the rhizomes to become short-creeping, whereas the rhizomes of *C. orizabae* usually are somewhat short-creeping. The aspect of the two species is different; *C. microptera* normally has two-toned inflorescences with the greenish to pale brown perigynia contrasting with the darker scales, and *C. orizabae* usually has very dark inflorescences with the scales and exposed portions of the perigynia the same dark color. Hermann (1971) noted that the perigynia of his *C. volcanica* were "distinctly plano-convex" in contrast to *C. microptera*. The perigynia of *C. orizabae* are generally somewhat less flattened than those of *C. microptera*, but this is a somewhat variable (and difficult to assess) feature.

So far as known, the elevational separation of the two in Mexico is clear: *C. microptera* is mid-montane and occurs from 2100–2650 m, and *C. orizabae* is alpine and occurs from 3000–4300 m. The specimen from the State of México, Díaz P. 187, is very immature and its identity is somewhat uncertain, but it is from only 2500 m elevation.

Occasional populations of *Carex microptera* northward in the United States have especially the lowermost perigynia in the spikes more than 2 mm wide, but the few Mexican collections all have narrower perigynia. Kral 25693 and, to a lesser extent, Wagner & Solomon 4277, both from the same area in Durango, are unusual in having some culms with long lower inflorescence bracts and perigynia with a very short, almost evanescent tubular apex to the beak. Accumulation of more collections may demonstrate that these two numbers represent a distinct taxon. In my key, they might be run to *C. athrostachya* (but for the wider perigynia). For differences between *C. athrostachya* and plants here referred to *C. microptera*, see the discussion under *C. athrostachya*.

9. *Carex orizabae* Liebm. Mex. Halvgr. 75. 1850.—TYPE: MEXICO. Veracruz: Pico de Orizaba, 14000', in paludis, Sep 1841, Liebm. s.n. (holotype: C!; isotypes: GH! K! P!).

Figs. 1i, j, 2i.

Carex volcanica F. J. Hermann, Brittonia 23: 144. 1971.—TYPE: MEXICO. México: cerca del Paso de Cortés, entre Popocatepetl e Ixtaccihuatl, 3550 m, 30 Jan 1966, Rzedowski 21850 (holotype: US!, isotype: ENCB). [*Carex volcanica* Elmer, Leaflet. Phillip. Bot. 10: 3526. 1938, lacks a Latin description.]

Loosely caespitose in small clumps by very short-creeping rhizomes, rhizomes up to 6 mm long between shoots, fertile culms 15–70 cm tall, erect, trigonous, smooth except just below inflorescence where finely scabrous-angled; bladeless basal sheaths brown, ± persistent. Leaves 3–6, on the lower 1/4–1/2 of the culm;

blades 2–25 cm long, 1.5–4.5 mm wide, plicate, glabrous, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 2–16 cm long, tightly enveloping culms, glabrous, green; the inner band of sheaths glabrous, whitish hyaline, sometimes prolonged up to 1 mm beyond the leaf bases, the apex shallowly concave, whitish hyaline; ligules 0.8–3.1 mm long, rounded, the free portion entire to \pm erose, up to 0.4 mm long. Vegetative culms ca. 2–9 cm tall with 5–10 leaves; leaves tristichous and mostly clustered in the upper 1/5–1/2 of the culm. Inflorescences 1.1–2.2 cm long, densely capitate, the spikes difficult to distinguish, the lowest two spikes 0.5–3 mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or sometimes setaceous, 0.3–2.6 (–4) cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes 4–9 (–12), gynaeandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, ovoid, 5–11 mm long, pistillate portion 4.5–10 mm long, 3–6 mm wide, ca. 15–60-flowered, staminate portion 0.5–1 mm long, appressed against the pistillate portion, ca. 1–3-flowered. Pistillate scales 2.8–4.2 mm long, 1.4–2.1 mm wide, narrowly ovate, acute, dark reddish brown to purplish black with a narrow green to brown center and sometimes very narrow hyaline margins, 1-nerved. Staminate scales ca. 2.4–3.6 mm long, ca. 1.2–1.9 mm wide, lanceolate to narrowly ovate, acute, dark reddish brown to purplish black with a narrow green to brown center and sometimes very narrow hyaline margins, 1-nerved. Perigynia 3.2–5.3 mm long, 1.2–1.8 mm wide, (2–) 2.6–3.4 (–4.1) times as long as wide, ascending-appressed, biconvex to \pm planoconvex with narrowly ovate to elliptic or rarely \pm suborbicular bodies 1.9–3.5 mm long, (1.3–) 1.6–2.7 times as long as wide and (1.1–) 1.5–2.5 (–3.5) times as long as the beak, widest 0.8–2 mm above base, narrowly to broadly thin-winged and serrulate-margined except near base, tapered into a beak, green to pale brown proximally, usually reddish brown to purplish black distally, glabrous, sessile, adaxial side (0–) 1–6-nerved over achene, abaxial side (0–) 1–11-nerved over achene; beaks (0.8–) 1.4–1.9 (–2.1) mm long, strongly flattened and serrulate-margined but with the apical 0.2–0.6 mm \pm terete and smooth, the apex obliquely erose to bidentulate with teeth up to 0.2 mm long. Achenes 1.3–1.9 mm long, 0.8–1.1 mm wide, 1.3–1.9 times as long as wide, biconvex, narrowly oblong to \pm obovate, pale brown, short-stipitate; style essentially straight; stigmas 2. Anthers 3, 1.2–2.5 mm long. Chromosome number unknown.

Frequent in wet to mesic alpine meadows and streambanks and open, seepy slopes in pine forest at 3000–4300 m, primarily in the Transvolcanic Belt, with one station in Oaxaca (Fig. 5). Fruiting from July through September, but with the perigynia somewhat persistent.

ADDITIONAL SPECIMENS EXAMINED. DISTRITO FEDERAL: alrededores del Llano de la Cieneguilla, arriba del Desierto de los Leones, 5 Sep 1979, *González E. 1109* (ENCB, MEXU, VDB); Delegación de Cuajimalpa, El Pantano, Desierto de los Leones, 20 Nov 1979, *González E. 1142* (ENCB, MEXU); Llano de la Cieneguilla, cerca del Cerro de la Palma, Sierra de las Cruces, 9 Jul 1967, *Rzedowski 23855* (DS, ENCB, LL, MICH, MSC, WIS).—MÉXICO: Mpio. Ixtapaluca, N slope of Volcán Ixtaccihuatl, main road from hwy to Estación Experimental Zoquiapan, 8 km S of Río Frío, 8 Oct 1983, *Anderson 12947* (MICH); Paraje Provincial, Mount Popocatepetl, 13 Apr 1938, *Balls 4204* (K-2 sheets, UC, US); Ojos de Agua, Nevado de Toluca, 10 Jul 1938, *Balls 4982* (K, UC, US); between kms 76 and 77 on Amecameca-Popocatepetl road, 2 Aug 1958, *Beaman 2064* (MEXU, MICH, MSC, UC); SW slopes of Volcán Ixtaccihuatl, along N side of hwy 451 just below (W of) Parque Ixtapopo entrance, 2 km W of road jct. at Paso de Cortés, 16 Jul 1978, *Cochrane & Cochrane 8564* (CAS, ENCB, MICH, MSC, WIS); Mpio. Ixtapaluca, Cañada de Temascatilla, 8 km al S de Río Frío, 17 Sep 1980, *Galván 699A* (ENCB); ladera NW del Popocatepetl, cerca de Paso de Cortés, 2 Dec 1979, *González E. 1151* (ENCB, MEXU, VDB, XAL); Nevado de Toluca, 14 Aug 1964,

FIG. 5. Distribution of *Carex orizabae*.

González Q. 1238 (ENCB, MICH), *González Q. 1238a* (ENCB); *González Q. 1246* (ENCB); Ixtacihuatl, *Purpus 8566* (UC); SW slopes of Volcán Ixtacihuatl ca. 8 km N of Paso de Cortés, 26 Feb 1988, *Reznicek 8116* & *Reznicek* (MICH). *Reznicek 8117* & *Reznicek* (MICH); Mpio. Chalco, Llano Grande, km 54 carretera México-Puebla, 26 Jul 1964, *Rzedowski 18465* (MSC, mixed with *C. curviculmis*); vertiente SW del Ixtacihuatl, 4 km al N de la Estación Retransmisora, 15 Jul 1965, *Rzedowski 20157* (DS, ENCB, F, MICH; all mixed with *C. peucophila* except for F sheet); vertiente SW del Ixtacihuatl, La Joya, Cañada de Alcalican, 1 Nov 1965, *Rzedowski 21572* (DS, ENCB, MICH); vertiente NW del Ixtacihuatl, en el región de Peñas Cuatas, La Ciénega, 6 Jan 1966, *Rzedowski 21795* (ENCB, MICH, US); 5 km al W de Paso de Cortés, vertiente NW del Popocatepetl, 9 Oct 1966, *Rzedowski 23269* (ENCB, MICH, MSC); ladera W del Ixtacihuatl, arriba de El Salto, Valle de Ayoloco, 19 Nov 1966, *Rzedowski 23477* (ENCB), *Rzedowski 23485* (ENCB); Mpio. Iturbide (Santiago Tlazala), alrededores de la presa Iturbide, 18 Jul 1967, *Rzedowski 25956* (MICH), *Rzedowski 25970* (ENCB); alrededores de la presa Iturbide, 6 km al WNW de Santiago Tlazala, 7 Aug 1977, *Rzedowski 35101* (ENCB, VDB); Mpio. Naucalpan, Villa Alpina, 2 Jul 1978, *Rzedowski 35698* (ENCB); alrededores de la Joya de Alcalican, extremo SW del Ixtacihuatl, 26 Nov 1978, *Rzedowski 36014* (ENCB, VDB); Mpio. Amecameca, la Joya de Alcalican, extremo SW del Ixtacihuatl, 2 Apr 1980, *Rzedowski 36655a* (VDB), *Rzedowski 36657a* (CAS, MEXU, OS, RSA, VDB), *Rzedowski 36660c* (ENCB); Mpio. Ixtapaluca, Llano Tepochaico, 10 km al S del Llano Grande, 12 Aug 1980, *Rzedowski 36822* (CAS, MEXU, RSA, US, VDB, WIS); Mpio. Ixtapaluca, Cañada de Temascatitla, 12 km al SSW de Río Frio, 14 Sep 1980, *Rzedowski 37014* (ENCB); Ixtacihuatl, end of road from Paso de Cortés and ca. 2 km NE of microwave tower, 22–23 Jun 1974, *Sanders 74092* (LL, MICH); Mpio. Ixtapaluca, Estación Experimental de Investigación y Enseñanza de Zoquiapan, 8 km al SW de Río Frio, 25 Jul 1978, *Vega 358* (ENCB, MEXU, MO), 20 Aug 1978, *Vega 432* (CAS, NY).—MORELOS: near lagoons in Lagunas de Zempoala National Park, 29 Jul 1987, *Freudenstein 2177* (MICH).—MICHIOACAN: Mpio. Tancitaro, N slope of Cerro Tancitaro, 22 Jul 1941, *Leavenworth & Hoogstral 1171* (F, ILL).—PUEBLA: Ixtacihuatl, S side of mtn, 1 Aug 1958, *Beaman 1989* (GH, MEXU, MICH, MSC, UC, US, WIS); *Beaman 1992* (GH, MSC, NY, TEX, US, WIS); Estación Forestal San Juan Tetla, 7 Oct 1968, *Boege 921* (GH); laderas orientales del Ixtacihuatl, por encima

de San Juan Tlale y San Juan Tetla, 8 Oct 1968, *Ern 314* (ENCB); Campo experimental San Juan Tetla, 17 Aug 1966, *May-Nah 1871* (ENCB); San Juan Tetla, 10 km al SW de San Martín Texmelucan, Llano Zacateotlalpan, 20 Aug 1966, *May-Nah 2142* (ENCB).—OAXACA: Sierra de San Felipe, 25 Aug 1894, *Pringle 5723* (GH).—VERACRUZ: Above los Molinos, Perote, 21 May 1938, *Bulls 4560* (K-2 sheets, US); Cofre de Perote, E side of mtn, 6 Aug 1958, *Beaman 2177* (F, GH, MEXU, MSC, TEX, WIS); Cofre de Perote, NW side of mtn, 7 Aug 1958, *Beaman 2202* (MSC, mixed with *C. peucophila*); Mpio. Perote, 11 mi (by air) SE of Perote, 1 km S of Cofre de Perote, 27 Jun 1982, *Diggs et al. 2610* (F, WIS); Pico de Orizaba, 12500', Jun-Oct 1840, *Galeotti 5781* (K, P); Pic d'Orizaba, 1838, *Linden 95* (K, MICH); Mpio. Calcahualco, NE slopes of Pico de Orizaba, 5 km NW of Jaical, 2 km NE of mountaineer shelter "Piedra Grande," 19°04'30"N, 97°15'W, 8 Jul 1982, *Nee & Diggs 24837* (F, NY).

Carex orizabae is a common component of moister alpine grasslands in the Transvolcanic Belt. One collection is known from Oaxaca and one from Guatemala. Normally, the uniformly dark color of the inflorescences provides an easy way to distinguish this species from all other Mexican members of section *Ovales*. Overmature inflorescences, however, tend to fade to a dull straw color, and plants in unusually shaded sites may also be paler, with the perigynia, especially when young, being nearly green. Distinctions from *C. microptera*, the only other similar species of section *Ovales* in Mexico, are given under that species.

Hermann (1971) described this species as *C. volcanica* presumably because he believed, following Mackenzie (1931), that the type of *C. orizabae* belonged with *C. bonplandii*. Neither in his description of *C. volcanica* nor in his Manual (Hermann 1974), however, does he mention the name *C. orizabae* in the synonymy of any species. *Carex orizabae* does not belong with *C. bonplandii*, as it has thin-winged, densely serrulate-margined, and usually \pm biconvex to somewhat planoconvex perigynia. *Carex bonplandii* (Type: America meridionalis, *Bonpland*; holotype: P!; isotype: P!) has narrowly thick-winged to nearly wingless perigynia that are only sparsely serrulate-margined and definitely planoconvex.

Carex orizabae is a member of an intricate and very difficult group of section *Ovales* centered on the bipolar *C. macloviana* and recognized by Mackenzie (1931) as his "subsection" *Festivae*. This group, the *C. macloviana* aggregate (Whitkus & Packer 1984), is characterized by having perigynia longer than the usually dark-colored subtending scales, with conspicuous terete and smooth beak apices and usually in small, ovoid spikes in a compact head. *Carex orizabae* can be readily distinguished from *C. macloviana* by its dark reddish brown to purplish black scales; *C. macloviana* has distinctive, copper-colored scales with a metallic luster. As suggested by Hermann (1971), the nearest relative of *C. orizabae* is probably *C. ebenea* Rydb., an alpine species of the southern Rocky Mountains, with which it shares the very dark scales and dark perigynia. *Carex orizabae* can be easily distinguished by its shorter perigynia 3.2–5.3 mm long; *C. ebenea* has perigynia (5.2–) 5.5–7 (–7.8) mm long. Although not noted by Hermann (1971), *C. orizabae* is also similar to the widespread but generally more northern high alpine species *C. haydeniana* Olney, which also has dark scales. *Carex haydeniana* is a compact, short plant never more than about 40 cm tall, and also has generally longer perigynia (4–) 4.5–6.5 mm long, but especially broadly winged, wider perigynia 1.7–2.6 mm wide. The perigynia of *C. orizabae* are only 1.2–1.8 mm wide.

Carex orizabae occasionally, but not consistently, produces some inflorescences with long bracts like those of *C. athrostachya*. Specimens of *C. orizabae* with a few culms having long bracts are, in fact, responsible for reports of *C. athrostachya* from Mexico previous to this treatment. *Carex athrostachya*, known

in Mexico only from Baja, is not a high-alpine plant, has paler scales and perigynia, is densely caespitose, and has the perigynia gradually tapering to an indistinct beak.

Although superficially appearing very uniform because of the compact, uniformly dark heads, *C. orizabae* is actually quite variable, especially in perigynium size and shape. Perigynium bodies range from narrowly ovate to elliptic or nearly orbicular, (1.3–) 1.6–2.7 times as long as wide, with beaks (0.8–) 1.4–1.9 (–2.1) mm long. Amount of development of the wing and the degree of flatness of the perigynium body are also quite variable (see Fig. 1i, j). However, achenes are quite similar in size and shape despite variation in perigynia. Nevertheless, this degree of variation is unusual in a member of the *C. macloviana* aggregate. There appear, however, to be no discontinuities that would define separate taxa nor any discernible geographical or altitudinal patterns to the variation. The species is here circumscribed broadly to include all the variation. A likely hypothesis for the origin of this variation is that *C. orizabae* is actively speciating on the relatively young volcanos of the Transvolcanic Belt, but has not yet differentiated into separate species. It is also possible, however, that *C. orizabae* may already be a complex of sibling species and that detailed field or laboratory studies might uncover subtle ecological or phenological correlations with morphology that would allow its subdivision into segregate taxa.

- 10. *Carex peucophila*** T. Holm, Contr. U.S. Natl. Herb. 8: 290. 1905. *Carex pinetorum* Liebmann, Mex. Halvgr. 75. 1850, non *Carex pinetorum* Willd. ex Schldl., 1836. *Carex festiva* f. *humilis* Boeckeler, Linnaea 39: 74. 1881.—**TYPE:** MEXICO, Veracruz: Pico de Orizaba, in graminosis pinetorum, 12000', Aug 1841, *Liebmann s.n.* (holotype: C!; isotypes: K! P!). Figs. 1k, 2j.
Carex straminea var. *australis* L. H. Bailey, Mem. Torrey Bot. Club 1: 23. 1889.—**TYPE:** MEXICO, Hidalgo: Real del Monte, *Coulter 1622* (holotype: K!; isotype: K!).
Carex pinetorum var. *elatior* Kükenthal, Das Pflanzenreich. IV, 20, Heft 38: 195. 1909.—**TYPE:** MEXICO, Oaxaca: Sierra de San Felipe, 8 Jun 1894, *Pringle 4685* (lectotype, designated by Mackenzie, 1931: B, destroyed; isolectotypes: GH! K! LL! MICH! MO! MSC! NY! US!).

Loosely caespitose to \pm colonial in small patches by short-creeping rhizomes, rhizomes up to 7 mm long between shoots; fertile culms 6–60 cm tall, lax and flexuous, trigonous, smooth except just below inflorescence, where finely scarious-angled; bladeless basal sheaths pale brown, rapidly disintegrating into short, brown fibers. Leaves 4–7, on the lower 1/8–1/4 of the culm; blades 4–25 cm long, 1.2–3 (–4) mm wide, plicate, glabrous, the margins and midrib antrorsely scarious; leaf sheaths ca. 1.5–6 cm long, tightly enveloping culms, glabrous, green; the inner band of sheaths glabrous, whitish hyaline, prolonged up to 1.5 mm beyond the leaf bases, the apex concave, whitish hyaline; ligules 0.8–3.5 mm long, rounded, the free portion entire to \pm erose, up to 0.6 mm long. Vegetative culms 1.5–7 cm tall with ca. 6–9 leaves; leaves tristichous and mostly clustered in the upper 1/4 of the culm. Inflorescences 0.8–2.2 (–2.7) cm long, erect to arching in a short, loose head, the upper spikes overlapping, the lowest two spikes 1–12 mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or sometimes setaceous, 0.4–2.4 cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes 2–5 (–7), gynaeceandrous; terminal spikes often slightly larger than the lateral,

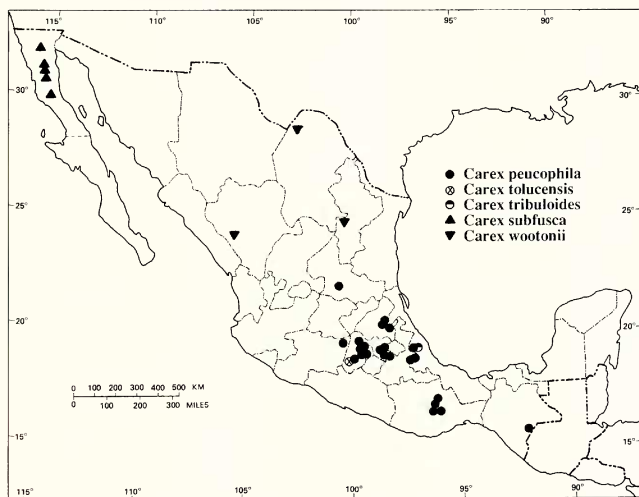


FIG. 6. Distribution of *Carex peucophila*, *C. subfusca*, *C. tolocensis*, *C. tribuloides*, and *C. wootonii*.

but otherwise essentially similar, ovoid, 4.5–11 mm long, pistillate portion 3.5–9 mm long, 3.5–7 mm wide, (2–) 4–25-flowered, staminate portion 1–3 mm long, ca. 1.5 mm wide, ca. 1–4-flowered. Pistillate scales 2.6–4 mm long, 1.6–2.4 mm wide, ovate, acute, yellowish brown to reddish brown with a narrow green center and narrow hyaline margins, 3-nerved. Staminate scales 2.6–4.8 mm long, 1.4–2.3 mm wide, ovate, acute, yellowish brown to reddish brown with a narrow green center and hyaline margins, 1 (–3)-nerved. Perigynia (3.3–) 3.5–4.4 (–4.7) mm long, 1.6–2 (–2.3) mm wide, 1.8–2.4 (–2.6) times as long as wide, appressed-ascending, plano-convex with elliptic-ovate bodies 2.3–3.4 mm long, 1.3–2 times as long as wide and (1.9–) 2.2–4 (–5.4) times as long as the beak, widest 1.1–1.8 mm above base, narrowly and thickly winged and serrulate-margined above the widest point, the wings arched forward, contracted into a beak, green to pale brown or sometimes the body dark reddish brown when ripe, glabrous, sessile, adaxial side nerveless or occasionally faintly 1–4-nerved over achene, abaxial side faintly (0–) 1–5 (–11)-nerved over achene; beaks 0.6–1.2 (–1.5) mm long, strongly flattened and serrulate-margined but often with the apical 0.1–0.3 mm \pm terete and smooth, the apex \pm bidentulate with scabrous-margined teeth up to 0.4 mm long. Achenes 1.5–1.9 mm long, (1.1–) 1.2–1.5 mm wide, 1.1–1.6 times as long as wide, biconvex, ovate-oblong, pale brown, short-stipitate; style essentially straight; stigmas 2. Anthers 3, 1.2–1.8 mm long. Chromosome number: $n = 37$ (Beaman et al. 1962).

A common plant locally in east central Mexico but occurring from southern San Luis Potosí to Chiapas and inland to eastern Michoacán (Fig. 6). *Carex peucophila* occupies various habitats from roadsides, streambanks, and moist meadows

in oak, oak-pine, or pine forests to alpine meadows and has a very wide elevational range from (2000-) 2400-3800 (-3950) m. Fruiting occurs from early July through September, but perigynia are persistent on the culms for several months.

ADDITIONAL SPECIMENS EXAMINED. CHIAPAS: Mt. Malé, near Porvenir, 6 Jul 1941, *Matuda 4632* (LL, mixed with *C. anisostachyis*).—DISTRITO FEDERAL: Delegación de Cuajimalpa, La Cieneguilla, cerca del Cerro de San Miguel, 9 Aug 1967, *Cruz C. 1706* (ENCB); Delegación de Alvaro Obregón, 5 km al NE de Cuajimalpa, 11 Jul 1967, *Cruz C. 1750* (MICH); Delegación de Alvaro Obregón, 5 km al NE de Cuajimalpa, 21 Aug 1969, *Durán M. 46* (ENCB); Delegación de Cuajimalpa, Desierto de Los Leones, 5 Sep 1979, *González E. 1106* (CAS, VDB, WIS, XAL); vicinity of La Cima Railroad Station, on top of the Serjána de Ajusco, 19°07'N, 99°12'W, 14 Aug 1960, *Illis et al. 933* (WIS); Llano de la Cieneguilla, cerca del cerro de la Palma, Sierra de las Cruces, 9 Jul 1967, *Rzedowski 23871* (US); Delegación de Tlalpan, alrededores de la estación La Cima, 8 Aug 1979, *Rzedowski 36176* (ENCB).—HIDALGO: Real del Monte, 12 Sep 1910, *Clokey 1694* (GH, UC), *Clokey 1698* (GH, UC); along Mineral del Monte-El Chico road ca. 2 km from Pachuca-Tampico hwy, 2 Aug 1987, *Freudenstein 2188* (MICH); El Chico Park, 2 Aug 1987, *Freudenstein 2189* (MICH); Mpio. El Chico, alrededores del Cerro de las Ventanas, 10 Jul 1979, *González E. 1055* (XAL); Mpio. Mineral del Monte, Real del Monte, near city of Pachuca, 27 Aug 1944, *Hernández X. 462* (MICH, MSC), *Hernández X. 465* (MICH, mixed with *C. vallicola* var. *hidalgensis* and *C. xalapensis*); 0.5 mi. N on Mex 105 from its jet with the road to Mineral del Monte, N of Pachuca, 19 Jul 1990, *Jones et al. 5521* (MICH, TAES); Mpio. Real del Monte, 1.5 km al WSW de Real del Monte, 16 Aug 1975, *Mendoza C. 662* (MEXU); above Pueblo Nuevo and below Parque Nacional El Chico on road from Real del Monte to El Chico, 25 Jul 1948, *Moore & Wood 4104* (A, MICH); between Pachuca and Real del Monte, 19 Jul 1905, *Rose 8694* (NY, US); Cerro de las Ventanas, al N de Pachuca, 4 Aug 1963, *Rzedowski 17032* (ENCB); Mpio. Singuilucan, Cerro Cercano a El Ocote, 7 Sep 1963, *Rzedowski 17228* (ENCB); Cerro Ventoso, 5 km al NE de Pachuca sobre la carretera a Real del Monte, 20 Jun 1965, *Rzedowski 19965* (ENCB, MSC); Cerro de las Ventanas, 6 km al N de Pachuca, 28 Aug 1966, *Rzedowski 22999* (ENCB, MICH, MSC, WIS); *Rzedowski 23018* (ENCB, MSC); 25 Jun 1967, *Rzedowski 23823* (ENCB, MICH); Mpio. Epazoyucan, cerca de Peñas Largas, 3 Aug 1975, *Rzedowski 33429* (ENCB); Presa Jaramillo, 4 km al N de Pachuca, 29 Jul 1978, *Rzedowski 35752* (ENCB); Mpio. Epazoyucan, cerca de Peñas Largas, 22 Jul 1979, *Rzedowski 36227* (MEXU); Mpio. Epazoyucan, 1 km al S de El Guajolote, 22 Jul 1979, *Rzedowski 36238* (MEXU).—MÉXICO: below Ojos de Agua, Nevado de Toluca, 11 Jul 1938, *Balls 5005* (K, US); Paso de Cortéz, 17 Sep 1958, *Beaman 2579* (GH, MSC); Tlaloc, near summit of mtn, 22 Aug 1958, *Beaman 2336* (MICH, MSC); Iztaccihuatl, S side of mtn between La Joya and Altzomoni, 25 Mar 1961, *Beaman L-39* (MSC, chromosome voucher pressed from greenhouse material); 24 Jul 1962, *Beaman L-39-3* (MSC, pressed from greenhouse material); Mpio. Zoquiapán, Llano Grande, cerca de Río Frío, 16 Sep 1966, *Cruz C. 1280* (ENCB); Mpio. Tlalmanalco, Llanos La Cienega, vertiente NW del Ixtaccihuatl, en región de Peñas Cuatos, 18 Jul 1982, *García P. 1631* (MICH); 1 km de Cahuacán, sobre la carretera a Villa del Carbón, Sep 1977, *González E. 991* (CAS, VDB); Mpio. Ixtapaluca, Llano Grande, cerca de Río Frío, 14 Oct 1979, *González E. 1135* (MEXU), *González E. 1136* (MEXU, VDB); Nevado de Toluca, 14 Aug 1964, *González Q. 1233* (ENCB); Mpio. Ixtapaluca, Estación Experimental de Investigación y Enseñanza de Zoquiapán, 8 km S de Río Frío, Llano de Aculco, 4 Jul 1975, *Koch 75282* (ENCB, MEXU); San Rafael Atlixco, Jul 1929, *Lyonnet 278* (MEXU, US); Nevado de Toluca, 19 Oct 1952, *Matuda 26602* (MEXU, NY); peak of Popocatepetl, 7-8 Aug 1901, *Rose 5994* (MICH, NY, US); Mpio. Nicolás Romero, 1 km al S de Cahuacán, 27 Jun 1963, *Rzedowski 16816* (ENCB); vertiente SW del Ixtaccihuatl, 4 km al N de la Estación Retransmisora, 15 Aug 1965, *Rzedowski 20157* (DS, ENCB, MICH); all mixed sheets with *C. orizabae*; vertiente N del Nevado de Toluca, 6 Aug 1966, *Rzedowski 22873* (ENCB); 5 km al W del Paso de Cortés, vertiente NW del Popocatepetl, 9 Oct 1966, *Rzedowski 23252* (ENCB); Mpio. Nicolás Romero, 2 km al SE de Cahuacán, 11 Jun 1967, *Rzedowski 23814* (ENCB); Mpio. Texcoco, 8 km al E de Coatlinchán, 20 Jul 1967, *Rzedowski 24043* (MICH); Mpio. Iturbide, Palomas, 8 Aug 1968, *Rzedowski 25929* (DS, MICH); mixed with *C. curvicalmis*; alrededores de La Presa Iturbide, 6 km al NNW de Santiago Tlazala, 7 Aug 1977, *Rzedowski 35101-A* (ENCB); 5 km al W de Progreso Industrial, sobre la carretera a Villa del Carbón, 18 Sep 1977, *Rzedowski 35280* (ENCB); Mpio. Naulcalpan, Villa Alpina, 1 Jul 1979, *Rzedowski 36151* (ENCB).—MICHIOACÁN: Summit of Cerro San Andrés, ca. 12 kms (straight line distance) N of Ciudad Hidalgo, 6 Sep 1960, *Beaman 4305* (MSC).—OAXACA: 19 km NE of hwy 190 on road to Guelatao (hwy 175), just below "La Cumbre," 12-13 Oct 1983, *Anderson 13069* (ENCB, MEXU, MICH); along road through San Juan del Estado, 20 km from the Pan-Am hwy, 24 Jul 1987, *Freudenstein 2158* (MICH); near km 127 along Tuxtepec-Oaxaca Rd, 26 Jul 1987, *Freudenstein 2163* (MICH);

along hwy 175, 15.5 mi NE of Gelatao, 24 Dec 1975, *Reznicek & Gregory M-313* (MICH); Sierra de Zempoaltepetl, 2 km by road SW of El Carrizal, along road from Tlacolula to Yarganiza, ca. 37 km E of Oaxaca, 20 Feb 1988, *Reznicek 8067 & Reznicek* (MICH); Sierra de Juárez, along hwy 175, 15.5 km by road SW of Cerro Pelón, ca. 55 km NE of Oaxaca, 21 Feb 1988, *Reznicek 8074 & Reznicek* (MICH).—PUEBLA: Iztaccihuatl, S side of mtn, 31 Jul 1958, *Beaman 1979* (MSC); Pico de Orizaba, SW side of mtn in cañada, 10 Sep 1958, *Beaman 2510* (GH, MEXU, MICH, MSC, NY, TEX, US, WIS); Campo experimental San Juan Tetla, 10 km al SW de San Martín Texmelucan, 20 Aug 1966, *May-Nah 2069* (ENCB, MSC); Arroyo Paso Buey, NW side of Volcán Pico de Orizaba and 7 km NW of the summit, 0.5 km SE of Miguel Hidalgo, 7 Sep 1986, *Nee & Soule 33020* (NY, WIS); Puerta del Emperador near La Venta, 18 Aug 1944, *Sharp 44433* (MO); Paso de Cortés, alrededor del monumento entre Ixtaccihuatl y Popocatepetl, 28 Jun 1970, *Weber 368* (ENCB, MICH).—SAN LUIS POTOSÍ: 23.8 mi E on Mex 70 from its jct with Mex 57/80 in San Luis Potosí, SE of Altimira, 21 Jul 1990, *Jones et al. 5590* (MICH, TAES).—VERACRUZ: Cofre de Perote, NW side of mtn, 7 Aug 1958, *Beaman 2202* (MSC, mixed with *C. orizabae*); Mpio. Calchahuaco, 4 km SW of Jacal, 19°06'N, 97°14'W, 6 Jul 1982 *Nee & Diggs 24776* (F, NY, WIS); Mpio. Perote, Cofre de Perote, by road at km 22 from Perote, 5 Sep 1976, *Pankhurst 76/136* (F).

Although a common plant locally, this species has had much too wide a Mexican range ascribed to it by past authors. Hermann (1974) noted it from "Baja California and Durango to Guatemala," but the Baja and Durango plants are here referred to *C. lagunensis*. As well, high elevation collections with narrow perigynia are here described as *C. curviculmis*. As here circumscribed, *C. peucophila* is restricted to east-central and southern Mexico, south very locally at higher elevations to Guatemala, and comprises small plants with short-creeping rhizomes, usually lax and flexuous culms, and few, small, spikes of relatively short perigynia (3.3–) 3.5–4.4 (–4.7) mm long and 1.8–2.4 (–2.6) times as long as wide, with short beaks 0.6–1.2 (–1.5) mm long. The Chiapas specimen (Mt. Malé, *Matuda 4632*) is too immature for certain determination, but is assigned to *C. peucophila* because Mt. Malé barely attains 3000 m, the lower elevational limit of *C. curviculmis*, the only other species to which the specimen could be referred.

The other two ± widespread species with short inflorescences and reddish brown pistillate scales that occur in Mexico, *C. curviculmis* and *C. lagunensis*, are often mistaken for *C. peucophila*. They differ significantly in perigynium size and proportions, as shown in Fig. 7.

Although *C. peucophila* occurs over an extremely wide altitudinal range, there seem to be no essential differences between plants of lower elevations and plants from the highest elevations, except that the high-elevation plants tend to be more compact, especially when growing in exposed habitats. Some collections from lower elevations, especially those growing in deep shade, can be very depauperate, with only a few, small, narrow perigynia per spike. These can be almost impossible to key properly. The report of *C. deweyana* Schwein. from Mexico (Cochrane 1981) was based on one of these depauperate specimens, *Hernández X. 462* (MSC). *Carex deweyana* should be deleted from the Mexican sedge flora.

Kükenthal (1909) united *Carex peucophila* with the Andean South American *C. mandoniana* Boeck. (under the name *C. pinetorum* Liebm.). Some high elevation Andean plants do appear to be identical with *C. peucophila*, but the type of *C. mandoniana* (Bolivia, Prov. Larecaja, vicinias Sorata, Nov 1858–Apr 1859, *Mandon 1429*; holotype: B, destroyed; isotypes: GH! K! MICH! NY-3 sheets! P!) is not. It has very narrow achenes ca. 1 mm or less wide and small perigynia that are scarcely winged and only sparsely serrulate-margined on the beak and uppermost part of the body, and appears to belong to the *C. bonplandii* complex. A great deal more work is needed on South American members of section *Ovales* before their systematics can be resolved.

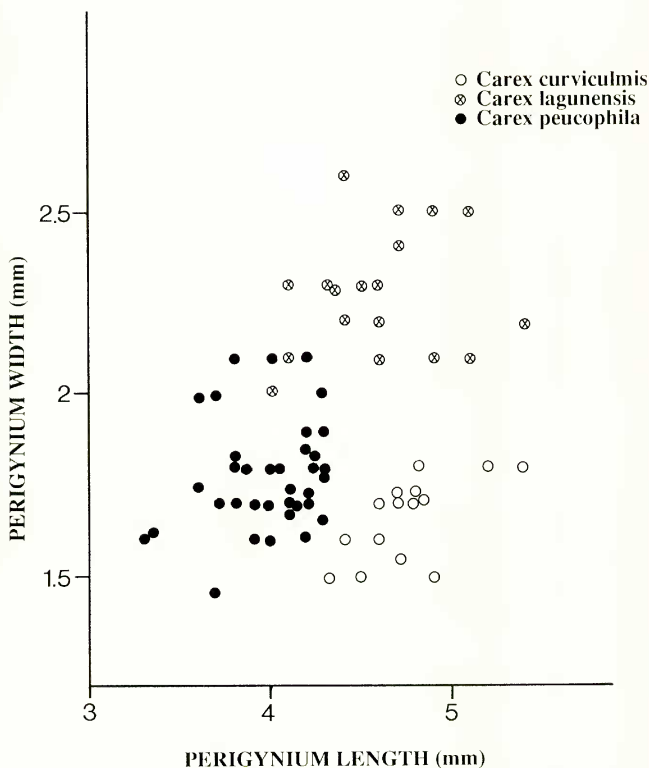


FIG. 7. Scatter plot of perigynium length and perigynium width for *Carex curviculmis*, *C. lagunensis*, and *C. peucophila*.

11. *Carex subfusca* W. Boott in S. Watson, Bot. S. Calif. 2: 234. 1880.—TYPE: U.S.A. California: Lake Tahoe, Bear Valley, Kellogg *s.n.* (lectotype, here designated; GH!). Figs. 11, 2k.

Densely caespitose in small clumps; fertile culms 15–90 cm tall, erect, trigonous, smooth except sometimes just below inflorescence, where finely scabrous; bladeless basal sheaths pale brown, \pm persistent. Leaves 4–8, on the lower 1/10–2/5 of the culm; blades 3–30 cm long, 1.2–3.5 mm wide, plicate, glabrous, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 1.5–9.5 cm long, tightly enveloping culms, glabrous, green; the inner band of sheaths glabrous, whitish

hyaline, prolonged up to 3.5 mm beyond the leaf bases, the apex shallowly concave to convex-prolonged, whitish hyaline; ligules 1.4–6 mm long, rounded, the free portion entire, up to 0.4 mm long. Vegetative culms ca. 3–12 cm tall with ca. 6–8 leaves; leaves tristichous and mostly clustered in the upper 1/2 of the culm. Inflorescences 1.1–2.2 (–2.8) cm long, in an ovoid head, the upper spikes overlapping, the lowest two spikes 1.2–5 mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or rarely setaceous, 0.4–1 (–3.5) cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes (3–) 5–9, gynaeandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, ovoid, 6–11 mm long, pistillate portion 5–9 mm long, 4–6 mm wide, ca. 10–40-flowered, staminate portion 1–3.5 mm long, ca. 1.5–2 mm wide, ca. 1–8-flowered. Pistillate scales 2.1–3.9 mm long, 1.3–1.7 mm wide, ovate, acute, yellowish brown to reddish brown with a narrow green center and hyaline margins, 1-nerved. Staminate scales 2.2–3.9 mm long, 1.4–2 mm wide, ovate, acute to acuminate, pale yellowish brown to reddish brown with a narrow green center and hyaline margins, 1-nerved. Perigynia 2.7–4.1 mm long, 1.2–1.7 mm wide, 1.9–2.6 times as long as wide, spreading-ascending, plano-convex with ovate bodies 1.8–2.7 mm long, (1.2–) 1.4–1.8 times as long as wide and (1.6–) 1.9–2.5 times as long as the beak, widest 0.8–1.3 mm above base, narrowly winged and serrulate-margined above the widest point, contracted into a beak, green to pale brown, glabrous, sessile, adaxial side (0–) 3–7-nerved over achene, abaxial side 3–11-nerved over achene; beaks 0.9–1.3 mm long, flattened and serrulate-margined but with the apical 0.2–0.4 mm terete and smooth, the apex obliquely erose. Achenes 1.1–1.7 mm long, 0.9–1.1 (–1.2) mm wide, 1.1–1.5 times as long as wide, biconvex, ovate-oblong, pale brown, short-stipitate; style straight; stigmas 2. Anthers 3, 1.3–2.6 mm long. Chromosome number: $n = 42$ (Whitkus 1991).

A common (or at least commonly collected) species of wet meadows, seepy or seasonally moist slopes and rocky banks, streambanks, and lakeshores at 1600–2700 m in the Sierra San Pedro Mártir and the Sierra de Juárez of northern Baja California (Fig. 6). Fruiting specimens have been collected from May through September.

ADDITIONAL SPECIMENS EXAMINED. BAJA CALIFORNIA NORTE: Sierra San Pedro Mártir, head of Cañada el Copal and S slope of Cerro Venado Blanco, 3 Jun 1988, *Boyd 2313 et al.* (F, RSA); Sierra San Pedro Mártir, saddle at SW end of Cerro Venado Blanco, 17 Jul 1988, *Boyd 2600 et al.* (F, RSA); Sierra San Pedro Mártir, Yerba Buena, 31°00'N, 115°27'W, 16 Aug 1967, *Moran & Thorne 14179* (SD, WIS); Sierra San Pedro Mártir, Los Llanitos, 30°58'N, 115°26'W, 17 Aug 1967, *Moran & Thorne 14277* (SD); Sierra San Pedro Mártir, La Encantada, 30°55'N, 115°24'W, 19 Aug 1967, *Moran & Thorne 14344* (RSA, SD); Sierra San Pedro Mártir, La Concepción, 31°01'N, 115°37'W, 31 May 1968, *Moran 15045* (RSA, SD); Sierra San Pedro Mártir, above Yerba Buena, 31°02'N, 115°27'W, 30 May 1977, *Moran 24201* (SD); Sierra San Pedro Mártir, Arroyo La Grulla, 5 km SW of La Grulla, 30°51'1/2"N, 115°31'W, 10 Aug 1977, *Moran 24475* (ARIZ, RSA, SD), *Moran 24483* (SD); Sierra San Pedro Mártir, ca. 3 km NW of Los Llanitos, 30°59'N, 115°26'1/2"W, 3 Sep 1979, *Moran 28011* (SD); Sierra San Pedro Mártir, near stream below La Grulla, 30°53'1/2"N, 115°29'W, 8 Jun 1982, *Moran 30928* (MICH, MSC); Sierra San Pedro Mártir, E of Vallecitos, 30°00'1/2"N, 115°27'W, 2 Jul 1982, *Moran 30986* (SD); upper San Jose Creek bottom, 0–3 mi beyond end of road into N end of high Sierra San Pedro Mártir, 7 Jun 1962, *Olmsted 4570* (RSA); left-hand fork of SSE tributary of Río San Rafael, N end of high Sierra San Pedro Mártir, 7 Jun 1962, *Olmsted 4627* (RSA); below upper end of road from San José (Melling) Ranch and oak pasture below Prado del Corona in central Sierra San Pedro Mártir, 10 Jun 1962, *Olmsted 4759* (RSA); Sierra San Pedro Mártir, along Arroyo Rancho Viejo, 6 miles by road S of Vallecitos Meadow, 31°57'30"N, 115°25'W, 18 Jun 1988, *Sanders 7975 et al.* (RSA); Sierra de Juárez, Laguna Hansen (Laguna Juárez), 32°04'22"N, 115°54'13"W, 13 Jul 1987, *Tallent 744* (MICH), *Tallent 745* (MICH); Sierra de Juárez, Constitución National Park, N end of Laguna Hansen, 28 May 1983, *Thorne 55727 et al.* (RSA, SD); E margin of

Laguna Hansen, 28 May 1983, *Thorne 55892 et al.* (RSA, SD); Sierra San Pedro Mártir Nat'l Park, upper Vallecitos meadows, 30°01'N, 115°28'W, 18 Sep 1983, *Thorne 57229 et al.* (RSA); Vallecitos, 30°01'N, 115°28'W, 18 Jun 1985, *Thorne 60822 et al.* (RSA); Parque Nacional San Pedro Mártir, N of Vallecitos, 30°02'N, 115°28'W, 19 Jun 1985, *Thorne 60945 et al.* (RSA); Sierra San Pedro Mártir, 31°02'N, 115°28'W, 7 May 1986, *Thorne 61983 et al.* (RSA); Sierra de Juárez, Parque Nacional Constitución de 1857, Laguna Hansen, 26 May 1987, *Thorne 62388 et al.* (RSA); Sierra San Pedro Mártir, La Encantada, 22 Sep 1930, *Wiggins & Demaree 5004* (GH, POM); about 1 mile SW of Observatory gate, on graded road from San Telmo, 31°01'40"N, 115°29'20"W, 29 May 1982, *Yatskivych 82-192 et al.* (ARIZ).

Carex subfusca has small, narrowly winged perigynia 2.7–4.1 mm long, 1.2–1.7 mm wide, with ovate bodies and terete beak apices that are unlike those of any other species of section *Ovales* in Mexico. The pistillate scales in this species are occasionally large enough to essentially cover the perigynia. It is confined to northern Baja and coexists with no other species except *C. athrostachya*, which is also confined to Baja. *Carex subfusca* is wide ranging in the western United States from Washington to Idaho and south to California and New Mexico; apparently it also occurs in Hawaii (Krauss 1950). The description above has been drawn exclusively from the ample Baja material. The relationships of *C. subfusca* to the other members of the *C. pachystachya* complex are discussed by Whitkus (1992).

- 12. *Carex toluensis*** (F. J. Hermann) Reznicek, comb. nov., *Carex subbracteata* var. *toluensis* F. J. Hermann, *Brittonia* 23: 145, 1971.—TYPE: MEXICO. México: 27 km SW of Toluca on road to Temascaltepec, 9 Jul 1964, *Mick & Roe 236* (holotype: MICH!; isotype: WIS!). Figs. 1m, 2l.

Cespitose in small clumps; fertile culms ca. 50–90 cm tall, erect, trigonous, smooth except just below inflorescence, where finely scabrous-angled; bladeless basal sheaths pale brown, persistent. Leaves 3–4, on the lower 1/5–1/3 of the culm; blades 3–30 cm long, 1.5–3 mm wide, plicate, glabrous, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 3–8 cm long, tightly enveloping culms, glabrous, green; the inner band of sheaths glabrous, whitish hyaline, not prolonged beyond the leaf bases, the apex concave, whitish hyaline; ligules 0.8–2.5 mm long, rounded, the free portion entire, up to 0.2 mm long. Vegetative culms unknown. Inflorescences ca. 1.7–2 cm long, in a dense narrow head, the upper spikes overlapping, the lowest two spikes ca. 3–6 mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or rarely setaceous, 0.4–1.2 cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes ca. 5–6, gynaeandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, ovoid, 6–9.5 mm long, pistillate portion 5–7.5 mm long, 5–7 mm wide, ca. 15–30-flowered, staminate portion 1–2 mm long, appressed against the base of the pistillate portion, ca. 3–7-flowered. Pistillate scales 3.2–3.9 mm long, 1.5–2.2 mm wide, narrowly ovate, obtuse to acute, reddish brown with a narrow green center, 1-nerved. Staminate scales 2.8–3.6 mm long, 1.6–2 mm wide, ovate, acute to acuminate, reddish brown with a narrow green center, 1-nerved. Perigynia ca. 4.2–4.9 mm long, (1.8–) 2–2.4 mm wide, 1.9–2.3 times as long as wide, appressed, plano-convex with elliptic to \pm suborbicular (sometimes somewhat asymmetrical) bodies ca. 3–3.3 mm long, 1.3–1.6 times as long as wide and 1.9–2.4 times as long as the beak, widest 1.4–1.7 mm above base, narrowly and thickly winged and serrulate-margined above widest point, contracted into a beak, green to pale brown, glabrous, sessile, adaxial side nerveless or faintly 1–3-nerved over achene, abaxial side faintly (0–) 3–7-nerved over achene; beaks 1.3–

1.6 mm long, flattened and serrulate-margined but with the apical 0.4–0.6 mm terete and smooth, the apex obliquely erose. Achenes ca. 1.9–2 mm long, 1.4–1.6 mm wide, ca. 1.2–1.4 times as long as wide, biconvex, broadly obovate, pale brown, short-stipitate; style essentially straight; stigmas 2. Anthers 3, ca. 1.2–1.5 mm long. Chromosome number unknown.

Known only from the type, collected near the Nevado de Toluca, State of México (Fig. 6), at 2800 m on a steep, west-facing slope dominated by *Pinus* and *Abies* with a tussock grass understory. Fruiting in July, so far as known.

This plant is raised to species rank because its resemblance to *Carex subbracteata* Mack. of low to moderate (up to about 1500 m) elevations in the California Coast Ranges seems only to be superficial. The inflorescences and overall habit of these two species are indeed relatively similar. The perigynia and achenes, however, are quite different. *Carex toluensis* has appressed-ascending perigynia 2–2.4 mm wide and ca. 1.9–2.3 times as long as wide with achenes 1.4–1.6 mm wide. *Carex subbracteata* has spreading-ascending perigynia 1.5–1.8 mm wide and ca. 2.3–3.1 times as long as wide with achenes 1.2–1.4 mm wide. As noted by Hermann (1971), the perigynia of *C. toluensis* are also more abruptly contracted to a beak than those of *C. subbracteata*. Except for the quite distinctive *C. wootonii*, *C. toluensis* is unique among Mexican members of section *Ovales* in combining perigynia greater than 2 mm wide and conspicuous terete, smooth beak apices.

13. *Carex tribuloides* Wahlenberg, Kongl. Vetensk. Acad. Nya Handl. 24: 145.

1803.—TYPE: America boreali, *Kalm s.n.* Efforts by Moberg and Nilsson (1990) to locate the type were unsuccessful. Figs. 1n, 2m.

Cespitose in small clumps; fertile culms (25–) 40–110 cm tall, erect, trigonous, smooth except just below inflorescence, where finely scabrous; bladeless basal sheaths brown, ± persistent. Leaves 7–10, on the lower 3/5–3/4 of the culm; blades 5–25 cm long, 2–5.5 (–7) mm wide, plicate, glabrous, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 2.5–9 cm long, somewhat loosely enveloping culms and ± wing-angled, glabrous, green; the inner band of sheaths glabrous, green with at most a very short, rapidly tapering hyaline zone at the apex (the lower sheaths sometimes with a longer hyaline zone), not prolonged beyond the leaf bases, the apex concave, whitish hyaline; ligules 4–12 mm long, rounded, the free portion entire to ± erose, up to 1.1 mm long. Vegetative culms ca. 25–70 cm tall, annual or sometimes perennating and rooting at the nodes if contacting the soil, leaves ca. 14–25, tristichous and mostly loosely clustered in the upper 1/2 of the culm. Inflorescences (1.9–) 2.3–7 cm long, the upper spikes overlapping, the lowest two spikes 3–15 mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or sometimes setaceous, 0.5–2.5 (–4.5) cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes (3–) 5–13, gynaeceandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, clavate-obovoid to ± turbinate, 6–16.5 mm long, pistillate portion 4.5–12 mm long, 5–9.5 mm wide, ca. (20–) 25–90-flowered, staminate portion 0.5–2 (–6) mm long, ca. 1.5 mm wide, ca. 1–4 (–9)-flowered. Pistillate scales 1.9–3 mm long, 0.6–1.3 mm wide, narrowly ovate, acute to acuminate, whitish hyaline to pale silvery brown with a green center, 1-nerved. Staminate scales ca. 2.4–3.8 mm long, ca. 0.8–1.3 mm wide, narrowly ovate, acute to acuminate, whitish hyaline to pale silvery brown with a green center, 1-nerved. Perigynia 2.8–5.2 mm long, 0.9–1.5 (–1.7) mm wide, (2.3–) 2.7–4 (–5) times as long as wide, appressed-ascending to ascending,

biconvex and very thin and scalelike except where distended by the achene, with narrowly ovate to lanceolate or oblanceolate (usually somewhat asymmetrical) bodies 1.9–3.6 mm long, 1.8–3 (–4) times as long as wide, and 1.9–4 times as long as the beak, widest ca. 1.3–2.3 mm above base, narrowly thin-winged and serrulate-margined above widest point, gradually tapered into the beak, green to pale brown, glabrous, sessile, adaxial side 3–7-nerved over achene, abaxial side 5–9-nerved over achene; beaks 0.8–1.4 mm long, strongly flattened and serrulate-margined to apex, the apex bidentulate with scabrous-margined teeth up to 0.5 mm long. Achenes 1.2–1.6 mm long, 0.6–0.8 mm wide, (1.5–) 1.8–2.3 times as long as wide, biconvex, narrowly ovate-oblong, pale brown, short-stipitate; style nearly straight to slightly sinuous; stigmas 2. Anthers 3, 1.1–2 mm long. Chromosome number: $n = 35$ (Moore & Calder 1964; Wahl 1940).

A rare plant of moist, broad-leaved forests at ca. 1200–1400 m; collected only in the vicinity of Xalapa, Veracruz (Fig. 6). Fruiting in April and May, so far as known.

SPECIMENS EXAMINED. VERACRUZ: 3 km al W de Xalapa, 8 May 1973, *Acosta & Dorantes 251* (ENCB); near Jalapa, 27 Apr 1899, *Pringle 7802* (GH, US).

Carex tribuloides ranges from Minnesota to southwestern Quebec and south to eastern Texas and northern Florida. The Mexican stations are quite disjunct, but the moist Mexican montane forests contain several disjunct occurrences of eastern deciduous forest *Carex* species, including *C. albicans* var. *australis* (L. H. Bailey) Rettig (*C. physorhyncha* Steud.), *C. bromoides* Willd. subsp. *bromoides*, *C. laxiflora* var. *serrulata* F. J. Herm., *C. lurida* Wahlenb., and *C. nigromarginata* Schwein.

Carex tribuloides is the widest leaved member of section *Ovales* in Mexico, with leaves up to at least 5.5 mm wide. The combination of narrow perigynia 0.9–1.5 (–1.7) mm wide and herbaceous, green inner bands to the sheaths is unique among Mexican species of section *Ovales*. It shares with *C. longii*, a close relative, well-developed, leafy, and elongate vegetative culms that can perennate and function in vegetative reproduction (Reznicek & Catling 1986). No other Mexican species are known to have this feature, although vegetative culms are unknown or poorly known in several species. *Carex tribuloides* also has quite leafy fertile culms, with the leaves extending 3/5–3/4 of the way up the culm. Only *C. longii*, with leaves extending (1/4–) 1/3–3/5 of the way up the culm, approaches this leafiness. Except for the enigmatic *C. interjecta*, all other Mexican species have the leaves nearly basal or only on the lower 1/3 of the culm.

Carex tribuloides is quite a variable species. Collections from the northern portions of the species range have long, narrow perigynia ca. 3.5–5.2 mm long and 3–4 (–5) times as long as wide, large spikes in \pm dense, stiff inflorescences, and quite wide leaves. Plants from the south of its range in the United States, especially from the Mississippi embayment and the western Gulf coastal plain, tend to have shorter, wider perigynia ca. 2.8–4.5 mm long and (2.3–) 2.7–3.2 times as long as wide, smaller spikes often in looser inflorescences, and generally narrower leaves. The southern plants were segregated by Mackenzie (1931) as var. *sangamonensis* Clokey, but whether or not this variation is really discontinuous and worthy of taxonomic recognition is uncertain and requires more study. The two Mexican collections of *C. tribuloides* are similar to the southern United States forms, but the description above includes the entire variation of the species.

- 14. *Carex wootonii*** Mackenzie, Smithsonian Misc. Collect. 65(7): 1. 1915.—TYPE: U.S.A. New Mexico: San Francisco Mountains, 15 Jul 1892, *Wooton s.n.* (holotype: NMC!). Figs. 1o, 2n.
Carex egglestonii var. *festivelliformis* F. J. Hermann, Brittonia 12: 78. 1960.—TYPE: MEXICO. Nuevo León: Mpio. Galeana, near peak of Cerro Potosí, 25 Jul 1938, [*Schneider*] 954 (holotype: MICH!; isotypes: F! GH! ILL! MO! NY! US!).

Densely caespitose in small clumps; fertile culms 25–70 cm tall, stiffly erect, trigonous, finely scabrous-angled; bladeless basal sheaths pale brown, \pm persistent. Leaves 3–5, on the lower 1/8–1/4 of the culm; blades 5–35 cm long, 1.8–3.8 (–4.5) mm wide, plicate, glabrous, the margins and midrib antrorsely scabrous distally; leaf sheaths ca. 4–8 cm long, tightly enveloping culms, glabrous, green; the inner band of sheaths glabrous, whitish hyaline to pale brown, usually prolonged up to 0.9 mm beyond the leaf bases, the apex concave, whitish hyaline; ligules 1.5–2.9 mm long, rounded, the free portion entire, up to 0.4 mm long. Vegetative culms poorly known, ca. 3–12 cm long, leaves ca. 6–10, mostly clustered in the upper 1/3 of the culm. Inflorescences 1.8–5 cm long, elongate, the upper spikes overlapping, the lowest two spikes 3–16 mm distant, spikes single at nodes, sessile, lowermost bracts scalelike or sometimes setaceous, 0.7–6 cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes 3–6, gynaeandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, clavate-ovoid, 7–21 mm long, pistillate portion 9–14 mm long, 4.5–9 mm wide, ca. 8–30-flowered, staminate portion 1.5–9 mm long, ca. 1.5–2 mm wide, ca. 1–8-flowered. Pistillate scales 3.8–6.6 mm long, 1.6–2.2 mm wide, narrowly ovate, acute, dark reddish brown with a narrow green center and wide hyaline margins, 1-nerved. Staminate scales 3.9–8.2 mm long, 1.5–2.1 mm wide, lanceolate to narrowly ovate, acute to acuminate, dark reddish brown with a narrow green center and hyaline margins, 1-nerved. Perigynia (5.2–) 5.5–7.5 mm long, 2.1–3 mm wide, ca. (2–) 2.2–3.1 times as long as wide, ascending, plano-convex with narrowly ovate to ovate bodies ca. 4–4.8 mm long, ca. 1.6–2 times as long as wide and 1.7–2.9 times as long as the beak, widest ca. 2–2.6 mm above base, broadly winged and serrulate-margined except near base, gradually tapered into a beak, green to pale brown, glabrous, sessile, essentially nerveless over achene on both faces; beaks 1.4–2.4 mm long, strongly flattened and serrulate-margined but often with the apical 0.1–0.4 mm terete, \pm hyaline, and smooth, the apex bidentate with scabrous-margined teeth up to 0.6 mm long. Achenes 1.9–2.7 mm long, 1.4–1.6 (–2.1) mm wide, (1.1–) 1.4–1.9 times as long as wide, biconvex, ovate-oblong, pale brown, short-stipitate; style essentially straight; stigmas 2. Anthers 3, 2.2–3.5 mm long. Chromosome number unknown.

An uncommon species occurring from Coahuila and Nuevo León south to Durango (Fig. 6) in dry to mesic meadows and clearings in pine forest at 2500–3600 m. Fruiting in July and August.

ADDITIONAL SPECIMENS EXAMINED. COAHUILA: Sierra Madre del Carmen, Campo El Tres, 29°00'N, 102°36'W, 5 Aug 1974, *Wendt & Adamcewicz 491* (ENCB, LL, MEXU, TEX).—DURANGO: Mpio. Pueblo Nuevo, 7 km al W de El Salto, 21 Aug 1981, *González E. & Rzedowski 1925* (ENCB).

This is the first Mexican report of this species, previously known from Arizona and New Mexico. It is distinctive among Mexican members of section *Ovales*

in having the largest perigynia, (5.2–) 5.5–7.5 mm long. Hermann (1960) described his *Carex egglestonii* var. *festivelliformis* with the Cerro Potosí specimen of *C. wootonii* as the type, but his concept was also based on *Pringle 1402*, here described as *C. festivelloides*. The combination of characters from the mixing of these two species (one of which was indeed undescribed) probably prevented him from recognizing *C. wootonii* in Mexico. *Carex egglestonii* differs from *C. wootonii* in having the spikes in dense, ovoid heads, and in having the beak uniformly flattened and serrulate to the apex. *Carex wootonii* relatively frequently has elongate lower inflorescence bracts like those of *C. athrostachya* and *C. festivelloides*. Besides *C. egglestonii* var. *festivelliformis*, the Schneider collection from Cerro Potosí has been reported as *C. orizabae* by Beaman and Andresen (1966) and McDonald (1990) and as *C. peucophila* by García-Arevalo and González-Elizondo (1991).

The Durango specimen (*González E. & Rzedowski 1925*) is somewhat disjunct and is placed with *C. wootonii* with some hesitation. In its overall aspect, and perigynium size and shape, it is a good match for *C. wootonii*. The inflorescence, however, is more compact than is usual for *C. wootonii*, and the achenes are much wider, ca. 1.9–2.1 mm wide and only 1.1–1.2 times as long as wide. *Carex wootonii* otherwise has achenes ca. 1.4–1.6 mm wide and 1.4–1.9 times as long as wide. The local California endemic *C. davyi* Mack. has large, wide perigynia like those of *C. wootonii* but more compact heads. It too, however, differs from the Durango plant in its narrower achenes, as well as having the perigynia strongly nerved over the achene adaxially. More material is needed to determine the constancy and significance of this variation, but this plant may well be a distinct entity.

EXCLUDED NAMES

Carex bonplandii Kunth, Enum. Pl. 2: 380. 1837.—TYPE: America meridionalis, *Bonpland s.n.* (holotype: P!; isotype: P!). Mackenzie (1931) reported this species from Veracruz, presumably on the basis of the type of *C. orizabae*, since he placed that species in the synonymy of *C. bonplandii*. Hermann (1974) reported *C. bonplandii* from Oaxaca, “Sierra de San Filipe [sic], 10,000 ft.,” but that specimen (*Pringle 5723*) is here referred to *C. orizabae*. *Carex bonplandii* apparently does not occur as far north as Mexico.

Carex festivella Mackenzie, Bull. Torrey Bot. Club. 42: 609. 1915.—TYPE: U.S.A. Wyoming: Albany Co., Centennial Valley, 7 Jul 1897, *A. Nelson 3275* (holotype: NY; isotypes: GH, MICH-fragment ex herb. F. J. Hermann!). The Mexican specimen referred by Mackenzie (1915, 1931) to this species is here described as *C. festivelloides*. *Carex festivella* was also reported for Cerro Tancitaro by Leavenworth (1946), but the specimen supporting that report, *Leavenworth & Hoogstral 1171*, is *C. orizabae*. Whitkus and Packer (1984) submerge *C. festivella* under a broad concept of *C. microptera*.

Carex oreades C. A. Meyer ex Galeotti, Bull. Acad. Roy. Sci. Bruxelles 9: 248. 1842, nomen nudum.

Carex purdiei Boott, Ill. Carex 1: 26, pl. 67. 1858.—TYPE: COLOMBIA. Bogs near the snow, Nevada de St. Martha, Jul 1844, *Purdie s.n.* (lectotype, here designated: K!). The single Mexican specimen tentatively referred to this species was redetermined as *C. echinata* Murray subsp. *townsendii* (Mack.) Reznicek; see Reznicek (1990).

Carex xerantica L. H. Bailey, Bot. Gaz. 17: 151. 1892.—TYPE: CANADA. [Saskatchewan]: File Hills, 4 Jul 1879, *Macoun s.n.* (syntype: BH); Moose Jaw, 18 Jul 1880, *Macoun s.n.* (syntype: BH). The two Mexican specimens referred to this species by Hermann (1974) are *C. lagunensis*.

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- | | |
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| 1. <i>C. athrostachya</i> | 8. <i>C. microptera</i> |
| 2. <i>C. brevior</i> | 9. <i>C. orizabae</i> |
| 3. <i>C. curviculmis</i> | 10. <i>C. peucophila</i> |
| 4. <i>C. festivelloides</i> | 11. <i>C. subfusca</i> |
| 5. <i>C. interjecta</i> | 12. <i>C. toluensis</i> |
| 6. <i>C. lagunensis</i> | 13. <i>C. tribuloides</i> |
| 7. <i>C. longii</i> | 14. <i>C. wootonii</i> |

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